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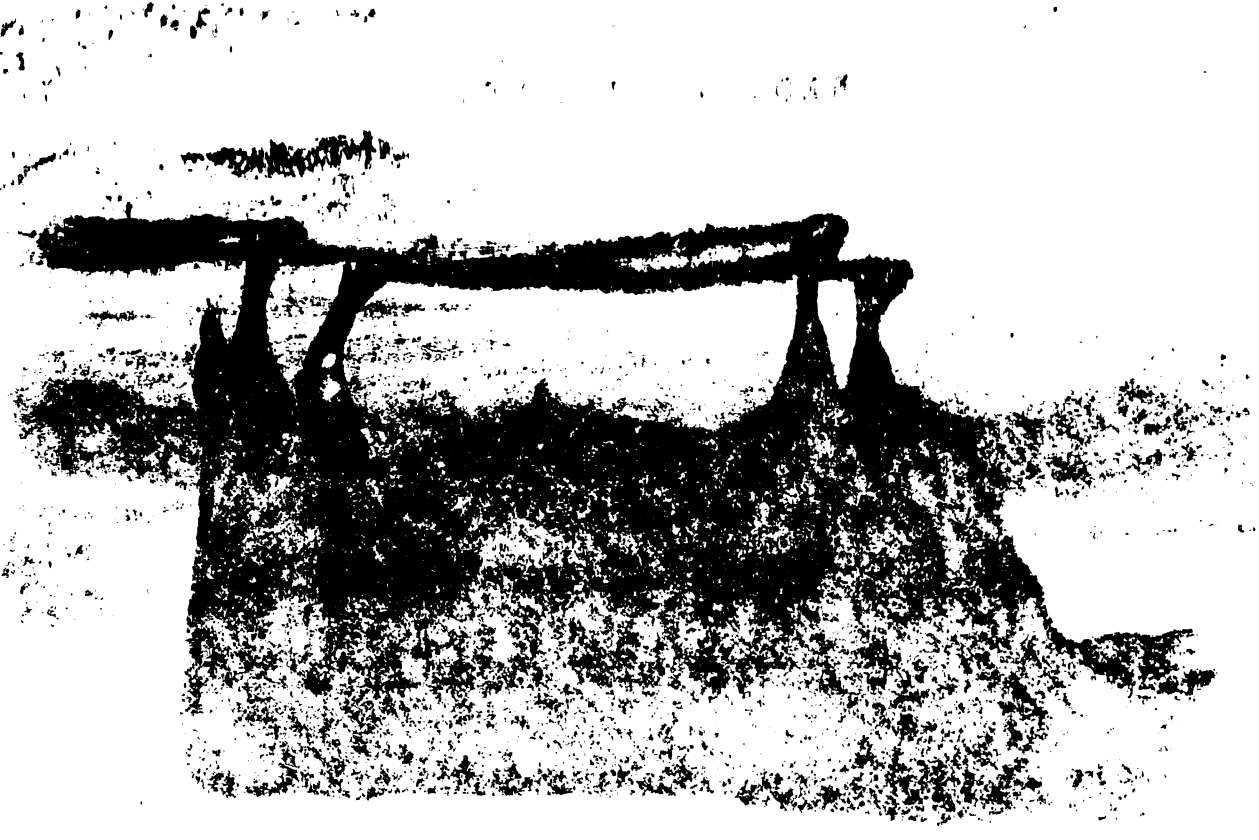

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TRANSACTIONS

OF THE

N. Y. State Agricultural Society,

WITH AN

ABSTRACT OF THE PROCEEDINGS

OF THE

COUNTY AGRICULTURAL SOCIETIES.

VOL. IX.—1849.

ALBANY:
WEED, PARSONS & CO., PUBLIC PRINTERS.
1850.

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Gift of the New York State Agricultural Society
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NOTICE.

The Ninth Annual Volume of the Transactions of the Society is submitted to the farmers of New-York, and an attentive perusal is asked for it. It is believed that this is the most valuable volume published, and contains matter of the utmost importance to the Agricultural interests of our country. The Lectures of Prof. Johnston are most timely, and their great value will be manifest to every reader. They show the intimate connexion between Science and practical Agriculture, and will carry conviction we think to every fair mind, of the unspeakable importance of Science to the farmers of our country, in its direct application to the profits of farming. The Prize Essay by Prof. Norton for Schools, entitled, "Elements of Scientific Agriculture," is a work that must find its way to every farmer's fire side and to every District School in the State, and the happy effects from it, will, we doubt not be seen throughout our entire Agricultural interest. The Survey of Washington county by Dr. Fitch is a very important work—and will undoubtedly be highly prized by the farmer, and is of more importance than any other Survey which has been made in this State, so far as the district of country which it embraces is concerned.

The subscriber desires to express his deep obligations to the officers of the State and County Societies, and to gentlemen interested in the advancement of the Agricultural profession, for the valuable papers furnished, as well as the aid and counsel he has derived from them in the preparation of this work. As the only return he can make, he gives the assurance that his best exertions shall be given to the Society and to the interest of the farmers, in endeavoring to advance the great and important work which has been entrusted to the Society with which he is connected.

B. P. JOHNSON.

Agricultural Rooms, February, 1850.

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CONTENTS OF VOLUME IX.

1. Report of the Executive Committee for 1849, ... 3
2. Agricultural Discussions at Annual Fair, ... 53
3. Reports of Committees at Syracuse, ... 84
4. Annual Meeting, 1850, ... 142
5. Prof. J. F. W. Johnston's Lectures, ... 162
6. Reports at Annual Meeting, ... 273
7. Communications, ... 384
8. Agricultural Statistics, ... 415
9. Reports from County Societies, ... 454
10. Agricultural Discussions, ... 584
11. Prof. Norton's Work, Elements of Scientific Agriculture, ... 602
12. Survey of Washington Co., Part II, ... 753
13. List of Officers and Constitution, &c., ... 1

I.

Report of Executive Committee, ... 3
Notice of the decease of Alexander Walsh, Col. Edmund Kirby, and Hon. E. Mack, ... 11 20
Henry Colman, ... 12
Annual Fair, ... 12
Letter from President Taylor, ... 19
State of Agriculture in Europe, an Address by Prof. J. F. W. Johnston, ... 24

II.

Agricultural Discussions at Syracuse, ... 53
Sheep and Sheep Husbandry, ... 53

Digitized by Google

Agricultural Schools,..... 62
Remarks of J. Delafield,,..... 52, 71, 83
Hon. Samuel Cheever,..... 63
Prof. J. P. Norton,..... 70
W. Buckland,..... 70
Resolutions of Lewis F. Allen,..... 70
Remarks.—Prof. J. J. Mapes,..... 72
Lewis F. Allen,..... 79
Mr. Heffron,..... 81
Hon. Daniel Lee,..... 81
Prof. James Higgins, Maryland,..... 82

III.

Reports of Committees at Syracuse,.....
Cattle.—Short Horns,..... 84
Devons and Herefords,..... 85
Ayrshires and Natives,..... 86
Working Oxen and Steers,..... 87
Fat Cattle and Sheep,..... 88
Horses.—All work and Draught,..... 89
Blood and 3 years old,..... 90
2 years old, Matched and Geldings,..... 91
Sheep.—Long and middle-wooled,..... 92
Merinos, Saxons and Wool,..... 93
Hartford Purse, (Merinos,)..... 94
Swine,..... 94
Poultry,..... 95
Foreign Stock,..... 95, 96 97
Premiums open to all,..... 97
Farm Implements,..... 97 98
Description Palmer's Wheat Drill,..... 99
Atkins' Seed Sower,..... 100
Seymour's Grain Drill,..... 100
Emery's Drill Barrow,..... 100
Batchelder's Corn Planter,..... 101
Plowing Match and Plows,..... 101
Dairy—Butter,..... 102
John Holbert's statement,..... 102
Nelson Van Ness,..... 103
John Shattuck,..... 103
John F. Clark and Abram Adams,..... 104

Digitized by Google

Horace Clapp,..... 104
Girls under twenty years of age,..... 105
Miss Bardwell and Miss Hopkins, ... 105
Cheese, ... 105
Roswell D. Brown's statement,..... 106
P. Carter and J. P. Hitchcock,..... 106
Sugar—Peter Mitchell's statement,..... 107
Luman Shepard, ... 107
Honey and Dugdale's Beehive,..... 108
Silk, ... 108
Domestic Manufactures,..... 109 110
Needle, Shell and Wax Work, ... 110
Flowers, ... 112
Fruit—Apples and Pears,..... 116
Peaches, Plums and Nectarines, ... 118
Grapes, Melons, Quinces,..... 119
Native Wines—B. Poppe, Syracuse, ... 120
C. A. Peabody, Georgia,..... 120
Melons, ... 121
B. Poppe's statement as to making Wine,..... 121 122
Foreign Fruits, ... 122
Vegetables,..... 125
Paintings, &c.,..... 126
Stoves, ... 127
Miscellaneous, ... 128
Smyth's Hydraulic Ram,..... 129
Cistern Pumps, Downs, Mynderse & Co.,..... 129
Rotary Fire Engine, A. W. Cary,..... 129
Draining Tiles, J. Delafield, ... 129
Iron Pumps, J. P. Cowing,..... 130
Dairy Steamer, T. A. Paine's,..... 130
Discretionary Premiums,..... 130 139
Musical Instruments, ... 139
Boardman & Gray's Dulce Campana Attachment to Piano, 139
Grain and Flour, ... 140
Wool, Fine, J. G. Strean's,..... 141
Flax, Hovey & Woodbury,..... 141

IV.

Annual Meeting, ... 142
Election Officers, ... 143
Fair recommended at Albany, 1850, ... 144

Digitized by Google

Exhibition in London, 1851, Resolution,..... 144
Library, Resolution of T. C. Peters,..... 144
Agricultural Bureau, T. Smith,..... 145
Amendment Constitution, Ex-Presidents,..... 145 146
Awards of Committees,..... 146
Annual Address, Hon. J. A. King,..... 147
Resolution Thanks to Prof. Johnston,..... 160
" as to decease Henry Colman,..... 160
Meeting Executive Committee,..... 161
Location Fair at Albany,..... 161
Laboratory,..... 161

V.

Lectures by Prof. Johnston,..... 162
Relations of Physical Geography to Practical Agriculture,..... 162
Geology and Mineralogy,..... 176
Botany, Vegetable Physiology and Zoology,..... 188
Meteorology,..... 198
Relations of Chemistry to the Soil,..... 210
Composition of Soils,..... 212
Relations of Chemical Physiology to the Plant, &c.,..... 222
Composition of the Ash of Grain and Root Crops, &c.,..... 227
Tobacco, Analysis Leaf and special Manure for,..... 230
Relations Chemical Physiology to the Animal, &c.,..... 232
Composition of Grains, Roots, &c.,..... 233
Manures,..... 244
Agricultural Education, &c.,..... 256
Resolution of thanks to Prof. Johnston, by Dr. Beekman,..... 269
Remarks of Hon. H. Baldwin,..... 269

VI.

Reports of Committees at Annual Meeting,..... 273
Report of J. Delafield, list of articles published in Transactions from 1841 to 1848,..... 273
J. Delafield on Draining,..... 278
Daniel Gates' method of Draining,..... 279
Essay on Indian Corn,.....
Report of J. Delafield,..... 280
Essay by Charles L. Flint,..... 281
Analysis by J. H. Salisbury, note,..... 290
Elements of Scientific Agriculture, by Prof. J. P. Norton,.....
Report of Committee,..... 294

Digitized by Google

Resolution of Dr. Beekman to publish 1000 copies, ... 296
Dairies—Report by B. P. Johnson, ... 297
Statement of butter made by various cows in England and United States, ... 298 300
Ayrshire Breed of cattle, history of, ... 301 306
Suggestions as to improving cows for the dairy, ... 306
Remarks of Moses Eames and A. L. Fish, ... 307
Suggestions as to the deterioration of grazing lands, and their restoration, ... 307 310
Butter Dairies, ... 310
Horace Clapp's statement, ... 311
Treatment of milk and cream, churning and making butter, 311
Causes of bad butter, ... 312
Premiums awarded, ... 312
Butter and Cheese—Report of H. Wager, ... 312
Wheat—Experiments thin and thick sowing, report of committee by J. Delafield, ... 313
Adam Clarke's experiments, ... 314
Wheat and Rye—Report of committee, ... 315
Adam Clarke's statement of crop of wheat, ... 315
G. K. Eells statement of spring wheat, ... 317
H. B. Bartlett's statement of spring wheat, ... 318
J. J. Thomas' experiments in cutting wheat at different periods, ... 318
David Conrad's statement of crop of rye, ... 319
Indian Corn—Report of committee, ... 320
E. R. Dix's statement of crop, ... 320
P. Crispel, jr., do 322
Barley, Oats, Buckwheat and Peas—Report of committee, ... 324
E. M. Bradley, statement of barley, ... 324
E. R. Dix, do 325
B. Enos, do 326
P. Crispel, jr., do of oats, ... 327
E. M. Bradley, do of oats, ... 327
Wm. Baker, statement of buckwheat, ... 328
Root Crops—Report of committee, ... 329
A. Killam, statement of method of raising potatoes from the ball, ... 329
Wm. Newcomb, experiments on potatoes, ... 331
Farms—Report of committee, with the statements of E. S. Salisbury and Helim Sutton, ... 332 350

Digitized by Google

Fruits—Report by Dr. Wendell,..... 350
Fruits recommended,..... 350
Description of fruits recommended,..... 353, 373
Apples—Dominie, Wine apple, ... 353, 354
Peck's Pleasant,..... 355
Pears—Doyenne D'eté, Andrews, ... 356, 358
Urbaniste, Flemish Beauty, ... 359, 360
Plums—Madison,..... 363
Peaches—Old Mixon or Freestone,..... 364
Crawford's Late Melocoton, Bergens yellow,..... 365, 366
Cherries—Knight's Early Black, Black Eagle, Graffion,..... 366 368
Gooseberries—Woodward's White Smith, Crown Bob, Green Walnut, Compton's Sheba Queen,..... 369, 370
Raspberries—Fastolff, Franconia, Yellow Antwerp, ... 371
Currants—Knight's Sweet Red, White Grape, Mays Victoria,... 373
Treasurer's Report,..... 375

VII.

Communications,.....
Grass cloth of China, Dr. D. J. Macgowan,..... 384
Flax, method of cultivation, W. Newcomb,..... 391
Water Rotting,..... 392
Analysis, seed and straw of flax, ... 394
Special manure for flax crop, ... 396
North American Pomological Convention,..... 397
Fruits recommended,..... 401 405
The Kirtland Pear, ... 404
Fruit Culture in Ohio, F. R. Elliott,..... 405
Salt Manufacture at Salina,..... 412
Marl Deposits, by E. Merriam,..... 414
Imported Cattle, A. Stevens,..... 450
Mt. Airy Agricultural College,..... 735
Cetonidæ, the potato insect, by Miss M. H. Morris,..... 736
Analysis of Apple and Rhubarb, by J. H. Salisbury,..... 737 744
Poultry, H. D. Richardson,..... 749

VIII.

Statistics, Agricultural,..... 415
Caledonia, Livingston county, A. H. McLean,..... 416
Camillus, Onondaga county, D. L. Pickard, ... 418

Digitized by Google

Spafford, Onondaga county, Sidney Smith,..... 419
Cicero, do Quartus Wells,..... 422
Oswego county, J. E. Bloomfield,..... 424
Butter and cheese shipped on canals, 1846, ... 429
do do do 1847, 8, 9, ... 431
Schoharie county, Hon. Austin Sexton, ... 433
Nichols, Tioga county, R. Howell,..... 436–9
Tioga, improvement in farming, G. H. Barstow, ... 439
Yates county, Charles Lee, Penn Yan,..... 440
Products, Wheat, Oats, ... 446
Potatoes, Barley,..... 447
Corn, Hay, ... 448
Dairy, Stock, &c.,..... 449
Meteorological Register for 1849, by H. P. Sartwell, M. D., ... 449

IX.

Transactions of County Societies,..... 454
Remarks of Executive Committee on Agricultural Education,.... 455
Allegany Report, ... 456
Cattaraugus,..... 457
Address, Hon. F. S. Martin, President,..... 459
Settlement of the County,..... 461
Population in 1830 and 1845,..... 463
Productions in 1844, ... 463
State Agricultural Society and Institute,..... 464
County Agricultural Society, ... 464
Agricultural Papers, ... 464
Dairies,..... 465
Cayuga, Report of President,..... 468
Products of the County shipped east,..... 469
Chautauque Report,..... 470
Draining, by Thomas Lascell, ... 472
Chemung,..... 472
Chenango, Report of President,..... 473
Butter and Cheese, 1849,..... 473
Fat Cattle, W. Wilcox,..... 474
Farms, Geo. Juliand,..... 475
Clinton, Report of Pres't, Location of Fair at Keeseville,..... 476
Cost of erections, ... 477
New mode of competition for Premiums,..... 477
Field Crops, ... 480

Digitized by Google

Columbia, Report and Address by President,..... 480
Agricultural Education,..... 481
Cortland, Report of President and Agricultural Productions,..... 482
Meditterranean Wheat,..... 482
Dairies, average of Butter and Cheese, per cow,..... 483
Delaware, Report of President, ... 483
Butter,..... 484
Black Sea Spring Wheat,..... 484
Dutchess Report, Corn, A. B. Underhill,..... 485
Erie, Report of Secretary,..... 486
Address by President, ... 487
Rotation Crops, Draining, Manures,..... 487
Farms in Clarence,..... 488
Berkshire Hogs,..... 489
Essex, Report of President, ... 489
Fulton and Hamilton, Report of President,..... 493
Genesee report, ... 494
Greene report,..... 495
Herkimer report, Pres't, ... 496
Dairies, report on..... 497
Marl, analysis of..... 499
Jefferson report, Pres't, ... 499
Farms and Dairies,..... 501
Seedling Potatoes, C. E. Clarke,..... 505
Portable Steam Engine for Farms,..... 506
Address, M. Eames, Cows for Dairy, ... 506
Ccl. E. Kirby, Tribute to 507
Lewis report, ... 508
Livingston report, ... 508
Wheat and other crops,..... 510
Madison report, ... 512
Draining,..... 513
Barley, new variety by Mr. Hess,..... 513
Monroe report, ... 514
Town Ag. Clubs,..... 516
Montgomery report, Pres't,..... 517
Wheat and other Grain crops, ... 517 518
Broom Corn, ... 518
Potatoes, method of cultivating, ... 518
Stock, Horses, Irish Hunter, ... 519
Niagara report, Sec'y,..... 519

Digitized by Google

Premium Crops,..... 521
Wire Fence, J. Trever, ... 522
Oneida report, Pres't,..... 523
Premium Crops, ... 525
Ag. Schools, Com.,..... 525
Statement Wheat Crop, 55 bus. per acre, ... 526
Vernon Town Association, ... 526
Onondaga report, Pres't, ... 527
Ag. School and Exp. Farm resolutions,..... 528
Ontario report, ... 529
Premium Crops,..... 530
Mr. Rankin's statement of Wheat, ... 530
Orange report, Pres't, ... 531
Orleans report, ... 532
Oswego report, Pres't,..... 533
Otsego report, Pres't,..... 534
Premium Crops,..... 535
Queens report, ... 536
Butter, ... 536
Butter by Miss Webb, 13 years old, ... 537
Rensselaer report,..... 537
Richmond, Organization of Society, ... 539
Constitution and Officers, ... 540
Rockland report, Pres't, ... 542
Saratoga report,..... 543
Location Fair for 5 years,..... 544
Enclosure and Buildings, ... 545
Premium Crops,..... 546
Broom Corn statement, ... 547
Schoharie report, Pres't, ... 547
Address, N. T. Rossiter, ... 548
Agricultural Education,..... 548
Seneca report, ... 550
Report of J. Delafield, Pres't,..... 550
Crops raised,..... 550 551
Stock,..... 553
Reaping Machine, Hussey's,..... 554
Burrall's Plow,..... 554
Cob Crusher, Ross,..... 554
Statistics,..... 554
Trial Plows, Report Com.,..... 556 560
Alex. Kirkwood, notice of address, ... 560

Digitized by Google

Flour, yield, of from bush. wheat,..... 561
Suffolk report, Pres't,..... 561
Crops, 1849, ... 561
Sullivan report, Pres't, ... 562
Yam Potato escapes disease, ... 563
Agricultural School,..... 563
Cheltenham Barley,..... 563
Premium Crops,..... 564
Ulster report, Pres't,..... 564
Field Crops,..... 564
Washington report, Pres't, ... 565
Wheat, statement of raising..... 566
Wayne report, Pres't, ... 567
Two Fairs, ... 568
Address R. G. Pardee, extracts,..... 569
Statistics of Grain, Fruit, &c., shipped from county,..... 569
Farms, Report Com., ... 571
Joseph Watson's Farm, statement, ... 572
Wheat, method of cropping,..... 573
Peat Swamps Draining,..... 574
Fences, ... 575
Buildings, ... 576
Proceeds and Expenses of Farm, 1849,..... 577
Westchester,..... 578
Grain Crops,..... 578
Corn statement, ... 579
Wyoming report, Pres't, ... 579
Dairies, Report on 580
Statistics Dairy, ... 581
Plowing Match,..... 582
Fall Plowing, ... 582
Yates' report, Sec'y, ... 583

X.

Legislative Agricultural Discussions, ... 584
Agricultural Education, ... 584
B. P. Johnson, remarks, ... 584
S. S. Randall,..... 585 589
Mr. Curtis, ... 585 592
Judge Miller, ... 585 592
Hon. Mr. Brewer,..... 587 592
" S. M. Burroughs, ... 587

Digitized by Google

Hon. F. S. Martin, ... 588
" Mr. Lawrence, ... 589
" Benj. Enos, ... 589
Judge Osborn, ... 590
Hon. Mr. Cowles, ... 591
" Mr Holmes, ... 591
" W. C. Bloss, ... 591
Mr. McAdam, ... 592
W. Buel, ... 593
Resolutions adopted, approving, ... 593
Myron Adams' remarks, ... 593
Fruits and Fruit Culture, ... 594
B. P. Johnson's remarks, ... 594
Grapes, Jas. Lennon, Rochester, ... 594
Slingerland Pippin, Seedling Apple, ... 594
Prof. Hall's description of 594
Prof. Emmons on varieties running out, ... 595
Judge Miller, remarks, ... 595
Mr. Curtis, cleft grafting Grape Vines, ... 596
Mildew on Grapes, how cured, Poppe, ... 121 596
Hon. A. Marks, Grapes, ... 596
Wheat Culture, ... 597
Hon. Mr. Brewer, Shallow Plowing and Drilling, ... 597
" Mr. Lawrence, Deep Plowing, ... 598
do Subsoiling, Drilling, &c., ... 598
Lt. Gov. Patterson, Deep Plowing, ... 599
Hon. Mr. Cowles, Deep Plowing, ... 600
Chess and Smut, remarks on 601

XI.

Prize Essay, Prof. Norton's, ... 602
Agriculture, Definition of 602
Plants, organic and inorganic parts, ... 604
Organic described, ... 604
Organic Elements of Plants, ... 605
Carbon, ... 605
Hydrogen, ... 606
Oxygen, ... 608
Nitrogen, ... 609
Potash, Soda, Lime, ... 612
Magnesia, Iron, Oxide Manganese, ... 613
Silica, Chlorine, ... 614

Digitized by Google

Sulphuric Acid, ... 615
Difference in Ash of Plants,..... 617
Facts as to Inorganic part of Plants, ... 618
Sources of the Food of Plants,..... 618
Organic Food,..... 618
Carbonic Acid, ... 619
Absorbed and decomposed by Leaves of Plants,..... 621
Carbon obtained by Plants from the Soil,..... 623
Humus—described, ... 624
Oxygen and Hydrogen, source of, ... 624
Sources of Nitrogen of Plants,..... 625
Organic substances of plants,..... 627
Supplies of organic food to plants,..... 633
The Soil, organic matter in,..... 635
Necessity for and liability to exhaustion,..... 637
Number of substances in Soil, Table I, ... 640
Mechanical improvement,..... 643
Draining,..... 645
Subsoil and Trench plowing, ... 649
Relations of Soil and Plant,..... 650
Analysis, Peas, Beans, Wheat, Table II,..... 651
Rotation of Crops, ... 652
Ash of Corn, Wheat, &c., Table III, ... 653
Cropping and special manuring..... 654
Principles of rotation, ... 657
Manures, necessity, ... 659
Irrigation, ... 660
Vegetable manures,..... 661
Analysis, Sea Weeds, Table IV, ... 663
Animal manures, ... 663
Analysis, Soil, Plant and Animal, Table V,..... 664
Bones,..... 664
Manures from Domestic Animals,..... 667
Guano, ... 669
Analysis of Guano, Table VI,..... 670
Fish manure, ... 671
Saline and Mineral Manures,..... 672
Analysis of marl, Table VII, ... 674
Gypsum,..... 675
Common Salt,..... 677
Saline manures, Analysis, Table VIII,..... 678
Wood and Coal Ashes, Analysis, Table IX,..... 680

Digitized by Google

Peat Ashes, Soot,..... 682
Composition of Crops, Wheat, &c.,..... 683
Buckwheat, Rice, Corn, Peas,..... 686
Root Crops,..... 688
Analysis of Organic substances in crops, Table 10, ... 691
Crops for Feeding,..... 691
Feeding young and growing animals,..... 695
Fattening animal, its food, ... 697
Soiling of Stock, ... 699
Keeping Stock in winter,..... 700
Form to give food,..... 702
Difference in manure,..... 704
Pastures, effects of feeding, ... 705
Milk, composition of, Table 11th,..... 706–7
Butter, ... 708
Cheese, Table 12,..... 711
Recapitulation of Essay, ... 714
Chemical Analysis, its nature, &c., ... 721
Geology, application to Agriculture,..... 728
Washington County Survey,..... 753
Sheep Husbandry, Soils, &c..... 753

ILLUSTRATIONS.

View of Show Grounds at Syracuse,..... Frontispiece.
Devon Bull, Major, ... do
Topographical view of Show Grounds,..... 15
View Floral Hall, ... 17
Short Horn Bull, Lamartine,..... 84
Short Horn Bull Calf, "Logan,"..... 85
Short Horn Cow, Charlotte,..... 86
Aryshire Cow, Ayr,..... 86
Ayrshire Bull, Dandy, ... 87
Devon Cow,..... 88
Merino Sheep, Buck and Ewe,..... 93
Implements,..... 100, 101
Short Horn Bull, Duke of Cambridge,..... 450
"Short Horn Heifer," 451
Fruits,..... 353–374
Washington County, Map, and illustrations of soil and rocks, &c.,

ERRATA.

Page 109, Miss Isabella Robb, Hearth Rug, instead of Misses J. and M. Robb.
140, 9th line, Chautauque, instead of Chenango.
493. Daniel Lasselle, President, instead of "Lafets."

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P. N. RUST, Syracuse.
WM. H. SEWARD, Auburn.
JOHN M. SHERWOOD, Auburn.
JOHN TOWNSEND, Albany, $100.
LUTHER TUCKER, Albany.
GEORGE VAIL, Troy.
STEPHEN VAN RENSSELAER,* Albany.
STEPHEN VAN RENSSELAER, Albany.
WM. P. VAN RENSSELAER, Beaverwick.
JAMES WADSWORTH,* Geneseo, $100.
JAMES S. WADSWORTH, Geneseo, $200.
WM. W. WADSWORTH, Geneseo, $75.

*Deceased.

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CONSTITUTION OF THE NEW-YORK STATE AGRICULTURAL SOCIETY.

The style of this Society shall be "The New-York State Agricultural Society." Its objects shall be to improve the condition of Agriculture, Horticulture, and the Household arts.

SEC. 1. The Society shall consist of such citizens of the State as shall signify in writing, their wish to become members, and shall pay on subscribing not less than one dollar, and annually thereafter one dollar, and also of Honorary and Corresponding members.

The Presidents of County Agricultural Societies, or a delegate from each, shall ex-officio be members of this Society.

The payment of fifty dollars or more shall constitute a member for life, and shall exempt the donor from annual contributions.

SEC. 2. The officers of the Society shall consist of a President, eight Vice Presidents, one to be located in each Judicial District; a Recording Secretary, a Corresponding Secretary, a Treasurer, an Executive Committee, to consist of the officers above named, and five additional members, and five of the Ex-Presidents shall be ex officio members of the Executive Committee, and these five shall consist of the five Ex-Presidents whose term of office has last expired, of whom three shall constitute a quorum; and that the Ex-Presidents of the Society, not members of the Executive Committee, shall constitute a Board of Councellors, to which may be referred, for consultation and advice, all questions that may from time to time arise, and in the decision of which the Society may in any manner be interested; and a General Committee, the members of which shall be located in the several counties, and be equal to the representations in the House of Assembly.

SEC. 3. The Recording Secretary shall keep the minutes of the Society. The Corresponding Secretary shall carry on the correspondence with other Societies, with individuals and with the general committee, in the furtherance of the objects of the Society.

The Treasurer shall keep the funds of the Society, and disburse them on the order of the President or a vice President, countersigned by the

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Recording Secretary, and shall make a report of the receipts and expenditures at the annual meeting in January.

The Executive Committee shall take charge of and distribute or preserve all seeds, plants, books, models, &c., which may be transmitted to the Society; and shall have also the charge of all communications designed or calculated for publication, and so far as they may deem expedient, shall collect, arrange and publish the same in such manner and form as they shall deem best calculated to promote the objects of the Society.

The General Committee are charged with the interests of the Society in the counties in which they shall respectively reside, and will constitute a medium of communication between the Executive Committee and the remote members of the Society.

Sec. 4. There shall be an annual meeting of the Society on the third Wednesday of January, in the city of Albany, at which time all the officers shall be elected by a plurality of votes and by ballot, with the exception of the General Committee for the counties, which may be appointed by the Executive Committee, who shall have power to fill any vacancies which may occur in the officers of the Society during the year. Extra meetings may be convoked by the Executive Committee. Fifteen members shall be a quorum for the transaction of business.

Sec. 5. The Society shall hold an Annual Cattle Show and Fair at such time and place as shall be designated by the Executive Committee.

Sec 6. This Constitution may be amended by a vote of two-thirds of the members attending any annual meeting.

State Agricultural Rooms, }
January 17, 1850. }

I certify the above to be a true copy of the Constitution of the New-York State Agricultural Society.

B. P. JOHNSON,
Cor. Secretary.

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LIBRARY ADDITIONS, 1849.

Purchased.

Sinclair's Survey of Scotland. 5 vols.
American Almanac, 1849.
Coates English Herd Book. Vol 8.
Kollar on Insects.
Johnson & Shaw's Agricultural Almanac. (London.)
British Almanac. (London.)
Coleman's Tour. 2 vols.
Farmer's Library, by Knight. 2 vols.
Donaldson's Manures, Grasses and Farming.
Supplement to British Husbandry, by Cuthbert W. Johnson.
Year Book of Facts.
Hoffman's Directory.
Farmer & Gardner's Book of the Seasons, 1849. (Cincinnati.)
American Almanac, 1850.
Natural History—Herpetology, Ichthyology, Mammalogy and Conchology. 3 vols.
McGregor's Resources of America. 2 vols.
Plough, Loom and Anvil. Vol. 2d.
Farmer's Magazine, (London,) Vols. 18 and 19. 2 vols.
Munsel's Register.

Donations.

Sheep Husbandry, by H. S. Randall, from I. S. Skinner, Philadelphia.
Elements of Agriculture, translated from the French, do.
Hovey's Fruits of America. Vol. 1. C. M. Hovey, Boston.
Albany Directory, J. Munsel, Albany.
Report of Comptroller of New-York, Hon. M. Fillmore.
Report of Superintendent of Salt Springs, R. Gere, Sup't.
Report Mass. Horticultural Society, 3d Triennial, B. V. French, Esq., Braintree.
Municipal Gazette, E. Meriam, New-York.
Fremont's Memoirs Upper California, Hon. N. R. Hall, Buffalo.
Report of Public Schools, Lowell, J. White, Lowell.
Genesee Farmer, D. D. T. Moore, Rochester.
President's Message and Documents, 1848, Hon. N. K. Hall.
Report Regents University, New-York, T. R. Beck, M. D.
Ranlett's Architect, W. H. Ranlett, New-York.
Fremont's Exploring Expedition with maps, N. K. Hall.
Prairie Farmer, Messrs. Wright & Wight, Chicago

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Michigan Farmer, W. Isham, Detroit.
Agricultural and Canadian Journal, Messrs. McDougal & Buckland, Toronto.
Valley Farmer, H. Gates, St. Louis.
Farmer and Mechanic, W. H. Starr, N. Y.
Ohio Cultivator, M. B. Bateham, Columbus.
Mark Lane Express, Wm. Shaw, Esq., London.
Transactions N. Y. State Civil Engineers, No 1, from Secretary.
Essex Agricultural Society's Transactions. 1831 to 1848. 2 vols., J. W. Proctor, Danvers, Mass.
A new System of Husbandry, by C. V. Arley, 1770, John Stephenson, Whitehaven, Durham, England.
Husbandman's Directory, by Francis Mitter, 1770, John Stephenson, Whitehaven, Durham, England.
Coates Herd Book, vol. 8, H. Strafford, Author, London.
Transactions Royal Improvement Society, Ireland, from 1843 to 1845, E. Bullen, Esq., Sec'y, Dublin.
Premium List, 1847, do do
The Nature and Property of Soils, John Morton, Esq., Author, London.
Report and Map of the Hydrographical Basin, Upper Mississippi, by J. W. Nicolet, Wm. A. Smith.
Smithsonian Institute, from Prof. Henry, Sec'y, &c., Washington.
Report on Bread Stuffs and Analysis of Wheats, L. C. Beck, M. D.
Agricultural Report Mass., 1848, James Rees, Utica.
Natural History of N. Y., original reports, 2 vols., L. C. Beck, M. D.
Service Pipes for Water, Prof. E. N. Horsford, Author, Cambridge.
Laws New-York, 1849, C. Van Benthuysen, Albany.
Premium List and Regulations Maryland State Agricultural Society, G. W. Dobbin, Esq., Baltimore.
Journal and Transactions Royal Improvement Society, Ireland, 1848, and 2 quarters of the year 1849, E. Bullen, Esq., Sec'y Dublin.
Smithsonian Institute, 3d Annual Report, A Dickens, Esq., Washington.
Random Recollections of Albany 1800 to 1808, C. Van Benthuysen.
Patent Office Report, A. Dickens, Esq., Washington.
Patent Office Report, Hon. E. Burke, Washington.
Natural History of Man, by Van Arminge, J. W. Taylor, Albany.
Proceedings N. Y. Historical Society, 1846, Charles Bryan, Albany.
Constitution New-York, with Marginal Notes, Charles Bryan, Albany.
New-York State Register, 1845, Charles Bryan, Albany.
American Fruit Culturist, J. J. Thomas, Author, Macedon.
Census United States, 1840, Joseph Cary, Albany.
Geological Survey of Canada, 1847–8, Mr. Wilkinson, Caledonia Springs.
Report Worcester Mechanic's Association, H. L. Emery, Albany.
Address Hon. M. P. Wilder, before Norfolk Agricultural Society, from Author.
Annual Report Spring Grove Cemetery, Cincinnati, A. H. Ernst, Cincinnati.
Report Exhibition Cincinnati Hort'l Society, do do
Address S. B. Parsons before New Haven Horticultural Society, Author.
Documentary History, New-York, 2 vols., B. P. Johnson.
7 Addresses before American Institute, 1840, J. W. Chambers.

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Reports Transactions Highland and Agricultural Society, Scotland, J. Hall Maxwell, Esq., Secretary, Edinburgh.
American Agriculturist, C. M. Saxton, New-York.
Northern Journal, Lowville, New-York, W. Oland Bourne, Editor.
Sabbath Recorder, New-York, Utter & Brown.
Southern Cultivator, Augusta, Ga., Hon. D. Lee.
Wool Grower, Buffalo, T. C. Peters, Esq.
Wisconsin Farmer, Racine, Mark Miller, Editor.
Mass. Ploughman, Boston, Messrs. Buckminsters, Editors.
Boston Cultivator, Boston, O. Brewer.
New-England Farmer, Boston, from the Proprietor, J. Nourse.
Maine Farmer, Augusta, Maine, Dr. E. Holmes.
Canadian Agricultural Journal, Montreal, Wm. Evans, Esq., Editor.
Syracuse Weekly Journal, V. W. Smith, Syracuse.
American Farmer, Baltimore, 5 vols., by Samuel Sands, Esq., Editor and Proprietor.
Municipal Gazette, New-York, E. Meriam.
Prof. Johnston's Lectures on Agricultural Chemistry, Geology, new edition, Edinburgh, Prof. Jas. F. W. Johnston, F.R.S., Durham University, England
Mulders Vegetable Physiology, with notes by Prof. Johnston, Prof. Jas. F. W. Johnston, F.R.S., Durham University, England.
Johnston's Contributions to Scientific Agriculture, Prof. Jas. F. W. Johnson, F.R S., Durham University, England.
Elements Agricultural Chemistry and Geology, Prof. F. W. Johnston, F.R.S., Durham University, England.
Use of Lime in Agriculture, Prof. Jas. F. W. Johnston, F.R.S., Durham University, England.
Johnston's Catechism Agricultural Chemistry, Prof. Jas. F. W. Johnston, F.R.S.. Durham University, England.
Genesee Farmer, 1847-48 and 49, from D. D. T. Moore, Editor, &c., 2 vols.

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CATALOGUE OF THE LIBRARY OF THE NEW-YORK STATE AGRICULTURAL SOCIETY, JAN. 1, 1850.

American Agriculture,		2
Agricultural Mechanism,		1
American Shepherd,	(Morrels,)	1
" Orchardist,	(Kenricks,)	1
" Gardener,	(Fessenden,)	1
" Poulterer's Companion,	(Bements,)	1
" Laborer,		1
" Farmer,	(Skinner's,)	12
" Herd Book,	(Allen's,)	1
" Agriculture,	(R. S. Allen,)	1
Agricultural Trans. Society of Arts,		4
Albany Institute Trans,		2
Agricultural Survey,	(West Lothian,)	1
American Institute Reports,		5
Agriculturist, American	(A. B. Allen,)	7
Agricultural Chemistry Association, Scotland,		1
Architectural Magazine, London,		5
Adulterations of Medicines,	(L. C. Beck, M. D.)	1
Agricultural Society Royal of France, 1815,		1
Aborigines of America,		1
Agricultural Reports, Mass., 1845, '6, '7,		1
Albany Ag'l Tracts, (J. Buel and others,) 2 Nos., pamphlet,		
American Cottage Library, 1848,		1
Allen's Bee Cultivator,		1
American Almanac,		7
Agricultural Addresses, 1842 to 1848,		1
Annual Register and Military Roster, S. N. Y. 1821,		1
Agricultural Journal, Lower Canada Ag, Society, 1848,		1
Agriculture, Treatise on,) by Wm. Evans, Montreal,		2
Architect, The, a series of original Designs, Wm. H. Ranlett,		2
American State Papers,		2
Arthur's Antiquarian,		1
Albany, Random Recollections of, 1800 to 1808, pamphlet,		
American Fruit Culturist, new edition,	(J. J. Thomas,	1
American Farmer,	(S. Sands, Baltimore,)	4
American Fowl Breeder, Boston, 1856,		1
American Biographical Sketch Book,		1
Agriculture, Royal Society Paris, Memoirs,		2
do do Bulletin,		1
A New System of Husbandry, by C. V. Arley, 1770,		1

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B.

Brown's Rural Affairs, Edinburgh, 1811,.....
Beet Sugar,.....(David Lee Child,) 1
Blacklock's Treatise on Sheep,..... 1
Boy's Agriculture of Kent,..... 1
Bailey's Survey of Durham,..... 1
Bailey, Culley & Pringle's Survey Northumberland,..... 1
Bedfordshire Survey by Batchelor,..... 1
Bath Society England, Papers and Surveys,..... 14
Board of Agriculture N. Y., 1820, 1832,..... 1
Bridgman's Young Gardener's Assistant,..... 1
Budget, London, 1764, pamphlet,.....
Beatty on Agriculture,..... 1
Board of Agriculture N. Y., 1, 2 and 3,..... 3
British Almanac, 1848, '9, '50,..... 3
Berwickshire Survey by Douglass,..... 1
Board of Agriculture, N. Y., 1815, 2d Vol.,..... 1
Beauties of the Horse,..... 1
British Husbandry and Supplement, by C. W. Johnson,..... 4
Berry's Improved Short Horns, pamphlet,.....
Beck, L. C, Report on Breadstuffs to Patent Office, pamphlet,.....
Buckland's Geology and Mineralogy,..... 2

C.

Complete Grazier,..... 1
Clater on Cattle and Sheep,..... 1
Chaptal's Agricultural Chemistry,..... 2
Complete Farmer,.....(Fessenden's,) 1
Comstock's Botany,..... 1
Cultivator,..... 11
Code of Agriculture,.....(Sinclairs,) 1
Chapman on Dry Rot,..... 1
Curwen's Hints on Agricultural Subjects,..... 1
Census New-York, 1845, folio,..... 1
Canal Frauds, 1847,..... 1
Coffee, Tea, &c., pamphlets,.....
Coleman's Tour,..... 2
Clarke on the Mulberry Tree,..... 1
Central New-York Farmer,..... 3
Coate's English Herd Book,..... 8
Chemical Ag. Society of Ulster Ireland,.....(Hodge's pamphlet)
Canadian Agricultural Journal, 1844-5-6,..... 3
Constitution of New-York, (adopted 1846,)..... 1
Census of United States, 1840,..... 1
Canada Geological Survey, 1847-1848,..... 2

D.

Dickson's Practical Agriculture,..... 2
Downing's Landsdape Gardening,..... 1
" Cottage Residences,..... 1
" Fruits and Fruit Trees,..... 1
" " " Colored plates,..... 1

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Dumfrieshire, survey by Desinger, ... 1
Davy's Agricultural Chemistry, ... 1
Dicksons' Farmer's Companion, ... 1
Downing's Lady's Companion to the House Garden, ... (missing) 1
Dog's Fanciers Guide, pamphlet, ...
Danbarton's Advice to Shepherds, published 1782, ... 1
Diseases of Animals, by Cowles, ... 1
Dairy System, ... (Harlein,) 1
Dog and Sportsman, by J. S. Skinner, ... 1
Donaldson on Manures, Grasses and Farming, ... (London,) 1
Documentary History of New-York, ... 2

E.

Ellsworth, Digest of Patents, U. S., ... 1
Essex (Mass.) Agricultural Society Trans., 16 No's, ... 2
Elements of Agriculture, translated by Skinner, ... 1
Essex Agricultural Society Report, 1848, ... 1
" " Transactions, 2d and 3d vol. 1831 to 1843, ... 2
Eton's survey of the Turkish Empire, ... 1

F.

Falt's Minorca, ... 1
Flora North America, ... 1
Fresonier's Chemical Analysis, ... 1
Farmer's Treasure 1
" Mine, ... 1
Family Library, Birds, Insects, &c., ... 3
Farmers' Encyclopedia, ... (Johnson,) 1
" Dictionary, ... (Gardner's) 1
" Cabinet, Philadelphia, ... 10
" Magazine, Edinburgh, 11th vol. missing, ... 21
Farnham's travels in Oregon, ... 1
Farmers' Library, ... (Skinner. N. Y.,) 2
Farmers' Assistant, ... (Nicholson, Albany, 1815,) 1
Farmer and Mechanic, N. Y., ... (W. H. Starr,) 4
Farmers' Magazine, London, ... 15
" Almanac, 1849 and 1850, ... (Johnson & Starr,) 2
Fremont's Exploring Expedition, with map, ... 1
Farmer and Mechanic, new series, ... 2
Farmer and Gardners' book of the Seasons, 1849, Cincinnati, ... 1
Farmers' Land Measurer, ... (By Pedder,) 1
Farmers' Library, ... (History of Animals, Knight's) 2
Fremont's memoirs of Upper California, ... 1

G.

Gooch's survey of Cambridgeshire, ... 1
Gray's Chemistry, ... 1
" scientific and practical Agriculture, ... 1
Gale's Natural Philosophy, ... 1
Genesee Farmer, ... 6
" New Farmer, ... 8
" 1846, 1847, 1848, 1849, ... 4
Geology of Vermont, ... 1
Griton's Pigeon Fancier, ... (very old edition,) 1

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Gazeteer of Scotland, ...(Chamber's large octavo,) 1
Geological and Agricultural survey of Rhode Island,.....(C. T. Jackson,) 1
Guenon's Treatise on Milch Cows,..... 1
Gourcy, Count de, voyages, Agric., England, France, &c.,..... 1
Georgical Essays,..... 6

H.

Henderson's survey of Sutherland,..... 1
Hitchcock's Geology, ... 1
Homegui, (Silk Culturist,)..... 1
Hind's Groom, ... 2
History Royal Agricultural Society, London,..... 2
Hints on Landscape Gardening,..... 1
Henderson's survey of Caithness,..... 1
Haynes on the Strawberry, Raspberry and Gooseberry,..... 1
Hand-book of needle work, ... 1
History of Insects, 2d vol. missing, ... 2
Hayman on Brewing,..... 1
Hannam's economy of waste manures, pamphlet, ...
Hints to American Husbandmen,..... 1
Hereford Herd Book, vol. 1st. 1
Horticulturist, ...(Downings,) 3
Horticultural Register and Gardner Magazine 1835, ... 1
Horticultural Register Boston, ... 3
Horticultural Register London, ... 3
Hovey's Fruits of America, ... 1
Horticulture Annals of Royal Society of Paris, ... 13
Husbandmans Directory by Francis Miller 1770,..... 1
Hoffman's Directory, ... 1
Helshams Lectures on Natural Philosopy, ... 1

I.

Importance of North American Colonies, ...(London 1761 pamphlet) 1
Insects of Massachusetts, ...(Harris) 1
Implements of Agriculture in England,.....(Ransoms) 1
Iroquios Indians History of, by Schoolcraft. 1
Iowa Farmer 1848-9, ... 2

J.

Johnstons Agricultural Chemistry, ...(3 sets) 4
Jardin de St. Petersbugh, ... 1
Journal of Agriculture and Science, Emmons and Osborn 1846-7, ... 2
" " " C. N. Bement 1845,..... 1
" " " by Mayer (German) 1831,..... 1
" " " and Science Highland and Agl. Society of Scotland, 21
Journal of Royal Irish Agl. Improvement Society for 1848, vol. 1,..... 1
" " " " 2 Nos. for 1849,.....
" Highland and Ag'l Society Scotland Nos. 19 to 25, ... (new series)
Johnsons Dictionary, ... 1

K.

Kents Survey of Norfolk, ... 1
Kanes Chemistry, ...(missing) 1
Koller on Insects,.....(2 copies) 2
Kirby and Spence's, Entomology, ... 1

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L

Loudon's Suburban Gardener, ... 1
" Gardener, ... 1
" Agriculture, ... 1
Little on Sheep, ... 1
Liebig's Organic Chemistry, ... 1
" Letter's, ... 1
Low's Survey of Nottinghamshire, ... 1
Lorain's Practical Husbandry, (1825,) 1
Livingston's Essay on Sheep, (1809,) 1
Laws of New York, (1848,) 1
" " (1849,) 1
Liebig's Animal Chemistry, ... 1

M.

Middlesex Survey, ... (By Middleton,) 1
Marshall's Review of the Board of Agriculture of England, ... 5
Memoirs Brand assn., ... 1
Massachusetts Agricultural Society Transactions, ... 9
Mavor's Surveys of Berkshire, ... 1
Murray's " Warwick, ... 1
McPhail's Gardener's Remembrancer, ... 1
Medical Repository, ... (By S. L. Mitchell and others,) 6
Main's Domestic Poultry, ... 1
" Planters' Assistant, ... 1
Massachusetts Agricultural Transactions, 1845, '6, '7, ... 1
Munsell's Albany Register, 1849, '50, ... 1
Mark Lane Express, 1848, '49, ... 2
Michigan Farmer, 1848, '9, ... 2
Massachusetts Agricultural Transactions, 1848, ... 1
McGregor's Statistics, Resources of America, ... 2
Municipal Gazette, ... (E. Meriam,) 1

N.

Norfolk Farmer, ... 1
Nayesmith's Survey Clyesdale, ... 1
Norman School Reports, 1846, '7, 8, (pamphlets.) .....
Natural History New-York, (15 vols. and map,) 15
" " first reports of Geologists to Legislature, ... 2
New-York Farmer, ... 5
National Calendar, 1820, ... 1
National Register, 1817, ... 1
New England Farmer, 1833. '34, ... 2
New-York State Register, 1845, ... (Holley's,) 1
New-York Historical Society Proceedings, 1843, '6, ... 2
Natural History, Conchology, Mammalogy, Ichthology, ..(Ruschenbergher,) 3
New-York Senate Journal and Documents, 1849, ... 4
" Assembly " " 9
North American Pomological Convention, 1849. .....
Natural History of Man, ... 1

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O.

Ohio Cultivator, 1847, '8, '9,.....(M. B. Bateham,) 3
Ohio Fruit Convention, 1849..... 1

P.

Poulterer's Companion,.....(Bements,) 1
Poultry Yard,..... 1
Pennock's Practical Mechanics,..... 1
Price on Sheep,..... 1
Plough Boy, 1819,.....(By S. Southwick,) 4
Pitt's Surveys of Straffordshire, ... 1
" Worcestshire,..... 1
" Northamptonshire,..... 1
Plimley's Survey of Shropshire, ... 1
Parkinson's " Huntingdonshire,..... 1
Priest's " Buckinghamshire, ... 1
Principles and Practice of Agriculture,..... 2
Peters' Farmers' Account Book,..... 1
Political Economy,..... 1
Proceeding's National Convention, Silk Grower's, ... 1
Planter's Guide, ... 1
Park's Chemical Essay's,..... 5
Parkinson's Treatise on Live Animal's,..... 2
Potatoe Disease, Chemical Association Scotland, ... 1
Philadelphia Agricultural Society Transaction's, ... 5
Patent office Report 1844, 1846, 1848,..... 3
Planter's Guide for removing large trees, ... 1
Pitkins Statical view of the commerce U. S. 1816,..... 1
Prince's Manual of Roses,.....W. R. Prince, 1
" Pomological Manual,....." 1
" Teatise on the vine,..... 1
Plough Loom and Anvil,.....(I. S. Skinner & Son) 1
Presidents Message and Documents 1848, ... 1
Prairie Farmer (Chicago) Wright & Wight,..... 2
Phitologeé Universellè. Des Plantes. 1

Q.

Quagley's Survey, Jersey and Guernsey,..... 1

R.

Renwick's Chemistry,..... 1
Rural Architecture, ... 1
Rudges Survey of Gloucestershire, ... 1
Robertson's Survey of Kindcardineshire, ... 1
Richardson's Essay on Agriculture,..... 1
Russel's Chemical and Practical Agriculture,..... 1
Russia, map of, ... 1
Renwick's Practical Mechanics, (missing.)..... 1
Report Board Internal Improvement, Mass., 1829, Pamphlets,.....
Report Trustees State Library, 1847, 8, and 9, Pamphlets,.....
Richardson's Domestic Fowl, ... 1
Randall's Sheep Husbandry, ... 1
Report Lowell Schools, ... 1
Report and Map of Hydrographical Basin Upper Mississippi,..(By Nicolet,) 1

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S.

Sinclair's Experiments on Grasses and Plants,..... 1
Skerritt on the Parturition of the Cow, ... 1
Superintendent of Schools, State N. Y. Report 1842, 6, 7, 8, 9, ... 3
Stevenson's Survey of Dorsetshire,..... 1
Somerville's Survey of East Lothian, ... 1
Silk Culture, (Engravings, &c.,)..... 2
Salisbury's Hints on Orchards,..... 1
Smithsonian Institute Contributions, Vol. 1, ... 1
Smithsonian Institute, 3d Annual Report to Congress, ... 1
Baron de Speck's work on management of an estate in Silesia, ... 1
Baron de Speck's Treatise on the breeding Electoral Saxony Sheep,..... 1
Baron de Speck's Treatise on Improved Farm Implements, ...
Sinclair's Survey of Scotland, ... 5
Service Pipes for Water,.....(Prof. E. N. Horsford, Pamphlet.)
South Carolina Agricultural Transactions, 1839 to 1846,..... 1
Spanish and English Dictionary, ... 1

T.

Treatise on Soils and Manures,..... 1
" " Management and Choice of Live Stock,..... 1
" " Water Meadows, ... 1
" " The Mulberry,..... 1
Transactions, N. Y. S. Agricultural Society, 1801-1816, ... 2
" " " 1841 to 1848, ... 8
Treatise on Cattle,.....(Society of Useful Knowledge,) 1
Thompson's History of Vermont,..... 1
Text book of Agriculture, by Davis, ... 1
Trees of America, by Brown,..... 1
Treatise on the Culture of Grain,..... (French,) 2
Turner's Chemistry,..... 1
Townley on Bees, ... 1
Turnip Fly, pamphlet,.....
Thomas Fruit Culturist, (small edition,) 1
Transactions Albany Institute,..... 1

V.

Vine, ... 1
Van Couver's Devonshire,..... 1
" " Hampshire, ... 1
Vermont Revised Statutes, 1839,..... 1
" State Papers, ... 1
" Session Laws, 1844-7,..... 1

W.

Wilson's Economy, ... 1
Worgan's Survey of Cornwall, ... 1
Washington's Letters, ... 1
Workingman's Companion, ... 1
Washington's Agricultural Correspondence,..... 1
Webster's Large Dictionary,..... 1
Watson's Elkanah History Western Canals and Berkshire Ag'l Society,..... 1
Walsh's Appeal, ... 1

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Worcester Mechanic's Association, Reports, 1849, pamphlet, ... 1
Westwood's Entomological Text Book, ... 1
Wood's Botany, ... 1

Y.

Youatt on the Horse, ... (Skinner's) 1
Young's Survey of Oxfordshire, ... 1
Young's Survey, Essex, Herefordshire, Suffolk, ... 3
Young's Survey, Lincolnshire, Norfolk, ... 2
Young's Farmer's Calender, ... 1
Youatt on the Horse, ... (English ed.) 1
Year Book of Facts, 1847-8-9, ... 3
Youatt on the Pig, ... 1

MAPS, &c.

Geological Map of New-York.
Map of Russia.
Map of Mexico.
Map of Mineral Lands.
Map, Plates, Jardin, de St. Petersburgh.
Fremont's Map of California, &c.
Geological and Agricultural Map of New-York.

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TRANSACTIONS.

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State of New-York.

No. 175.

IN ASSEMBLY, FEB. 12, 1850.

COMMUNICATION

From the Corresponding Secretary of the New-York State Agricultural Society.

STATE AGRICULTURAL ROOMS,
February 12th, 1850.

To the Hon. N. S. ELDERKIN,
Speaker of the Assembly:

In pursuance of the acts of the Legislature for the promotion of agriculture, I present herewith the annual report of the New-York State Agricultural Society, with the proceedings of the Executive committee, and abstracts of the reports of county societies for 1849.

Very respectfully yours,
B. P. JOHNSON,
Cor. Secretary.

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STATE OF NEW-YORK, }
IN ASSEMBLY, *February 12th*, 1850. }

Resolved, That thirty times the usual number of copies of the Report of the New-York State Agricultural Society be printed for the use of the Legislature; five hundred copies for the use of the Society; five hundred copies for the use of the American Institute, and forty copies for each county in the State for the use of the Agricultural Societies in said counties; and that the same be printed and bound under the direction of the Executive Commitee of the New-York State Agricultural Society, in a manner similar to the reports of previous years.

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TRANSACTIONS

OF THE

New-York State Agricultural Society.

REPORT OF THE EXECUTIVE COMMITTEE FOR 1849.

TO THE LEGISLATURE OF THE STATE OF NEW-YORK.

The Executive Committee of the New-York State Agricultural Society, in pursuance of the act for the encouragement of Agriculture,

RESPECTFULLY REPORT:

That the operations of the State and county societies during the year which has now closed, have been in the highest degree gratifying; showing an increased attention on the part of farmers, to the improvement of their farms, and much more regard to economy in their management, than heretofore, and an adaptation of their crops to the soil, so as to secure the best returns which the land is capable of yielding. The Executive Committee have held their regular monthly meetings during the year, at their rooms; and the subjects which have been presented before them, from practical farmers in different parts of the State, have been of deep interest, and far more numerous than at any former period. Inquiries on various subjects have been received, relating to the management of the farm, selection of seeds, diseases of animals, breeds of cattle, sheep and horses, best adapted to various purposes and different localities; of draining and its advantages, and information as far as within the power of the Executive Commit-

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tee, has been given. The experience of the past year, has but confirmed them in the importance of sustaining the Society in its operations, extending and increasing its facilities for aiding the agricultural interest in the efforts which are making to elevate its members, by an education suited to their profession, and by introducing, as far as may be suited to our Agriculture, improvements that have proved practically useful in other countries. It is gratifying to be enabled to state, that prejudices which have existed to the operations of agricultural associations, are yielding to the evidence which is furnished of their practical adaptation to the wants of the farmer. It has been our constant endeavor, to avoid every untried expedient, and to recommend and encourage only such practices, as experience has proved to be useful and salutary, and calculated to benefit the agricultural interest. Efforts have been made to enlist the enlightened, practical farmers in different parts of the State, in efforts in their own vicinity, to improve their system of husbandry, to introduce a more correct method of managing their farms, so as to preserve the fertility of the land, while the crops are increased. This has in many instances been secured; and the results are becoming manifest, and their influence is in the highest degree advantageous. The reports which have been heretofore made of the management of farms by competitors receiving the premiums of the Society, have been read with interest, and what has proved beneficial and remunerative, has attracted the attention of others, and in many instances, been adopted with beneficial results. One of the farms to which the first premium of the Society was awarded, was visited, during the season succeeding the award, by more than seventy individuals, for the express purpose of satisfying themselves, upon the farm itself, as to the valuable improvements which appeared in the statement of its owner; and it is but justice to him to say, that we have not learned of a single individual who made the examination but what admitted that the farm itself, in all its detail and arrangement, exceeded the expectation formed of it from the description which had been given of it in our Transactions.

The Executive Committee feel assured that they have been enabled to spread before the public, in the Transactions of the Society, sufficient evidence to satisfy the most incredulous that farming in this State, though it may not lead to sudden and enormous wealth, (and it is far from desirable that it should,) still is a remunerative business, and gives, in a pecuniary point of view, a liberal return for capital

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judiciously invested. That it is an employment best calculated for real enjoyment, best designed for permanent prosperity and security, as well as for the cultivation and enjoyment of all those moral and social qualities that give zest to this world's intercourse, is so apparent, that no argument is necessary to establish it.

It has been the constant aim of the Executive Committee to fully carry out the requirements of the acts of the Legislature, and they trust, that they have in some good degree been enabled to do so. They would respectfully direct the attention of the Legislature to some of the operations of the Society somewhat in detail. As in former years it has been their object to introduce, as far as practicable, *new seeds and fruits* among our farmers. The past year there have distributed a large number of different varieties of grains and roots, as well as scions of fruits. Many of these have proved highly useful; and when another season's trial shall have been given them, so as fully to establish their character, the results will be given through the Transactions of the Society.

The Legislature made, at its last session, a small appropriation for the purposes of an *Agricultural Museum*, and we have been enabled to add many articles of interest to that department; and it is hoped further appropriations will be made, so that it may become what it should be, an agricultural museum of all the implements and products of our own State not only but of the Union. Already we have secured in the department of plows, a variety, from the *Mexican plow*, the most rude implement—such as used in ancient Rome, 2000 years ago—to the most improved cast and wrought iron plow of the present day, which attract the attentive observation and examination of every farmer who visits our rooms. We have secured the wooden mold board plow, which had almost gone out of the memory of our farmers; the early cast iron plow of Jethro Wood, which was practically the foundation of improvement in our plows; and intend, if practicable, as we trust it will be, to secure every important improvement and alteration which has been made in this indispensible aid to the farmer in the preparation of his land for use. In the department of seeds, there have been secured samples of more than sixty varieties of wheat; upwards of thirty of Indian corn; about twenty each of barley, oats, buckwheat, &c. It is intended to have a description of the character and qualities of each variety of grain, for future publication, showing which are best adapted to our State at large, and which

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are best suited to particular sections of it. There have been secured samples of wool from a large number of the best flocks of sheep in this country as well as from Europe.

The collection which has been made, limited as it is, has attracted the attention of farmers visiting the city, who take occasion to examine it, and all express themselves gratified that it has been commenced, and unite with us in the desire that it shall be increased, until it shall in every respect be worthy of our State. The *library* of the Society is also receiving attention, and additions of works suited to the wants of agriculturists of the State are made as their funds will permit.

In regard to the importance of the library and museum, the following remarks relating to the Royal Agricultural Society's library and museum are in point:

"It has began the establishment of an agricultural library and museum, which presently must assume a considerable importance, and become curious and useful. The object of the library is to collect the most useful and valuable publications on subjects connected with agriculture, in all its various and kindred branches, including likewise geology, botany, agricultural chemistry, engineering and manufacturing, as far as they are connected with the making of agricultural implements, and the great agricultural operations of draining, embanking, irrigation, and other important farming processes. The object of its museum is to exhibit specimens of agricultural productions, which are capable of preservation, seeds, plants, grasses, samples of wool, mineral manures, models and drawings of agricultural implements, and whatever may conduce to the advancement of the science or practice of agriculture."

The subject of *agricultural education*, having been brought before the last Legislature by his Excellency, Gov. Fish, and having received a favorable consideration from them, we do not deem it necessary to enlarge upon that subject, and would only at this time ask the favorable consideration of the report of the commissioners appointed by the Governor in relation to the establishment of an Agricultural College, and Experimental Farm. It may not be improper, however, for us to state that in all our intercourse with the farmers of the State during the past season, we have heard but one opinion upon the subject, and that has been favorable to the establishment of a suitable institution for the education of those who are to engage in the practical

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business of life, in the professions of agriculture and mechanical labor. The age in which we live and the wants of the present day, seem to urge forward the establishment of an institution of this character, and we cannot doubt, that it would prove highly conducive to the best interests of agriculture, as well as the mechanic arts.

During the past year, the *correspondence* of the Society, both in our own country and in Europe, has been unusually extensive. Already in our own country, we have had correspondence with several new state societies, organized during the past year, and we have afforded as desired, all the information in our power, to aid them in their organization. Already we are in constant correspondence with gentlemen abroad distinguished for their interest in agriculture, and have been desired to furnish them with the progress of agriculture in this comparatively new world, which we have done, as far as our time and ability would enable us to do it; and it is no small gratification to be assured, as we often have been, that our society is exerting a most salutary influence abroad, as well as throughout our own country. The farmers of our own State have learned that they can receive at the hands of the Executive Committee, all the information they possess, in relation to the cause of agriculture; and they have, to a commendable extent, availed themselves of the opportunity afforded them, and the correspondence in this State has very largely exceeded that of any previous year. We trust it will continue to increase, assured as we are, that every needful facility will be afforded to enable the Executive Committee fully to answer every reasonable demand upon them in this direction.

The preparation of the annual *Transactions* of the Society is a work of no small labor and responsibility. Our annual report is sought after by gentlemen of every profession, in all parts of our own country, and is sent abroad to nearly every government in Europe. It has been the sole object of the Executive Committee, to make their report useful and valuable, and they have been enabled to present to the agriculturist, many articles of great value, and which they are happy to say have been by them duly appreciated. An intelligent farmer of this State writes in relation to the volume of Transactions sent him: "I think there is a *single article* in the volume of Transactions you sent me that is *worth more* to the farmers of our State than what the whole work cost." Expressions similar to this, are not uncommon, and they are encouraging, showing, as they do, that the objects aimed at by

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the Executive Committee, have in some good degree at least been secured. In the Transactions which we now submit to the Legislature, it is believed that there will be found articles of unusual value and well calculated to benefit the great agricultural interest of our State and country.

It having been found useful to the county societies to receive visits from the Secretary of the State Society, the practice has been continued during the past year, as in former years. The intercourse between the State and county societies in this manner, has proved in the highest degree useful. The president of one of the county societies, in noticing the attendance of the Secretary the present year, remarks: "In no way can the State Society afford so much aid and encouragement to the local societies, as by sending their Secretary often among them." To enable the Secretary to visit many of the county societies each year, will require some arrangement as to the time of holding their annual fairs, so as not to interfere with each other. During the past season, invitations were received to attend the fairs of five different societies, holding their annual meeting on the same days. One only could be visited. This is a matter that will require some attention, if it is desired, as it now generally is, for the Secretary to attend these annual gatherings of the farmers. The Executive Committee are desirous of extending as far as practicable this intercourse, and trust that some arrangements will be made, that will enable their Secretary to meet a larger number of the societies than has heretofore been practicable.

The attendance of delegates at the annual exhibition of our Society was unusually extensive, embracing representatives from most of the States of the Union, and the Canadas. Delegates from our Society were appointed to attend the annual meetings of the Michigan State Agricultural Society, Provincial Society of Canada West, and the Maryland State Agricultural Society. The reports of the delegates were highly interesting, showing that each of the societies visited had excellent exhibitions, and that they were cordially welcomed; and the intercourse between the societies thus happily commenced, was desired to be continued.

It has been deemed important to secure annual statistical returns from every county in the State, of its agricultural products. A very full return from the county of Seneca, of great practical value, was published in the Transactions for 1848. We *are* enabled the present

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year to give partial returns from several counties. We are impressed with the great practical importance of this matter, and desire to urge its consideration upon the Legislature. If the assessors of the towns were required annually to attend to this, we should be enabled to present to the farmers of this State annually, facts which would make them realize the importance of giving attention to improvement in the management of their farms. This has been the result of the report obtained in the county of Seneca; and it cannot be doubted, that it would operate in the same manner in every county in the State. When it is ascertained from the returns of the several towns in a county, that the annual products of one are much larger than another per acre of improved land, it cannot for a moment be presumed, that inquiry would not be made among farmers, "why this difference?" And when the reason is ascertained, the remedy would, without doubt, be applied, to bring up the deficient town to the standard of the most successful.

A distinguished English writer, in speaking of Agriculture, says: "Let it be remembered, then, that Agriculture is the immediate source of human provision; that trade conduces to the production of provision only as it promotes Agriculture; that the whole system of commerce, vast and various as it is, hath no other public importance than its subserviency to this end." The truth of the above extract must be obvious in its application to this country, where Agriculture is, and must ever be, pre-eminently *first* in importance, and all other pursuits secondary to it. It then can scarcely be necessary to urge further the importance of annual statistical returns, which should be in their character accurate and full. The census taken by the United States, and by our own State, once in five years, will not accomplish what is desired; and when we consider this great interest in all its bearings, it seems to us, that careful annual statistics are of such manifest necessity, that measures for obtaining them will not be much longer delayed.

The Survey of the County of Washington, of which a portion relating to the early history of that interesting section of our State, was given in our last report, will be found complete in the present. Its great practical value will be apparent on perusal. The manner in which it has been executed by Dr. Fitch, adds much to his already well earned reputation; and he can congratulate himself in having prepared a survey of his county, which will prove a model for future

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surveys. The Executive Committee are impressed with the importance of securing a thorough agricultural survey of every county in the State. The limited means of the Society, will render it altogether too distant in point of time to accomplish the work, in order that its benefits may be realized as early they should be. If the Legislature shall not deem it an object of sufficient importance to undertake, they intend to continue it as fast as their means will permit, believing, that in no other way, can they more usefully develop to the farmers of the State, the resources and capabilities of its soil, the methods best adapted to improve its husbandry in all its varied branches, and the crops best suited to the different counties.

We are happy in being permitted to announce that the services of John Delafield, Esq., of Seneca county, have been secured to complete a survey of that county the ensuing season, and we know of no gentleman better qualified for this work, and shall look with deep interest for the results of his survey.

Among the papers submitted is an agricultural work for common schools by J. P. Norton, Prof. of Agricultural Chemistry, Yale College. This will supply a deficiency that has long existed, for some work well adapted to our common schools, and also useful to the farmer. It is intended to follow this with other works of a similar character designed for more advanced scholars, so that in this department provision will be made, to enable those who are desirous of pursuing the subject to do so, with facilities at least equal to those in other pursuits. A gentleman writing on this subject, says: "There is hardly any science, of which children not educated in a farming community, are so entirely ignorant as that of Agriculture. Almost every child of a dozen years of age, has learned something of mechanical sciences, and can tell how houses and ships, mills and manufactories are constructed—can describe the earth, geographically considered—and knows the elementary principles of most of the physical sciences; but comparatively few of them, especially those who live in cities and thickly populated towns, can distinguish the different kinds of grains and grasses, or can tell why turnips are not planted in hills like potatoes; what vegetable is most likely to grow on sandy and dry soil, and what on the more heavy and clayey ground; what is the appropriate food of different animals, or what are the properties and uses of the various kinds of trees and shrubs which embellish or enrich the face of the earth." All that is intend-

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ed in this direction, is, to secure works of a popular character, divested as far as practicable of technicalities, and adapted to the wants of the young. We think the work which has been prepared by Prof. Norton will be found admirably adapted to carry out the views of the Executive Committee.

It becomes our painful duty to record the death, during the past year, of some of the most active and efficient members of our Society, who have from its earliest organization been identified with it, have aided greatly in sustaining and extending its influence; we allude to ALEXANDER WALSH, Esq., of Lansingburgh, Col. EDMUND KIRBY, of Brownville, and Hon. EBENEZER MACK, of Ithaca. Of Col. Kirby, the proceedings of the society at Syracuse, which will be found in their proper place, will show the estimate in which he was held, and the sentiments which were manifested at the loss sustained in his death.

At a meeting of the Executive Committee in August last, when the death of Mr. Walsh was announced, the following proceedings were had.

ALEXANDER WALSH.—This distinguished and ardent friend of Agriculture and horticulture, died at his residence in Lansingburgh on Saturday last, the 3d inst. Mr. Walsh was one of the earliest members and promoters of this Society, and has ever been among its most efficient supporters. The Executive Committee, desirous of testifying their respect to one who for many years was an officer of the Society, and actively engaged in advancing its interests, have adopted the following preamble and resolutions:

Whereas, Intelligence has been received of the decease of Alexander Walsh, Esq., of Lansingburgh, one of the earliest friends and promoters of this Society and for many years one of its officers, and ever an active and efficient friend of Agriculture: Therefore

Resolved, That the Executive Committee have heard, with deep regret, of the decease of their respected friend, and that they deeply sympathise with the bereaved family in their affliction.

Resolved, That a copy of the above proceedings be enclosed to the family of the deceased, signed by the secretary.

The Hon. EBENEZER MACK was warmly interested in the advancement of Agriculture, and devoted much time and attention to its improvement in his own county, and was a warm and efficient friend of the State Society. His loss will be deeply felt in the community

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where he lived, as well as by those associated with him in the Society.

Another distinguished friend of Agriculture, who for a time was a resident of our State, Mr. HENRY COLMAN, who had just completed his agricultural tour of England and the Continent, died at London in August last, when about to return to this country. Mr. Colman was extensively known for the ardor with which he engaged in agricultural pursuits, and by his writings and labors contributed largely to the advancement of this interest, both in New England and in this State, as well as the country at large. His death is sincerely regretted by his fellow countrymen. The following tribute to his memory appeared in the Mark Lane Express, showing in what estimate he was held in England: "It is with extreme regret that we announce the death of Mr. Henry Colman, of Salem, Massachusetts, U. S. Mr. Colman had been resident several years in this country and upon the continent of Europe, whither he had gone for the purpose of acquiring a knowledge of European agriculture, and which he diffused through the United States by means of a work published in parts, and which he completed a short time since. Mr. Colman was personally known to, and had been entertained at the houses of many of our leading land proprietors and tenant farmers. His moderate opinions and unassuming manners, rendered him a general favorite with ourselves, and many who will deplore his loss."

We would endeavor to improve these lessons of Divine Providence, which call upon us to be in earnest in the work before us, and to do what within us lies to advance, while we may, the great interests with which we are connected.

THE FAIR AT SYRACUSE.—The ninth Annual Fair of the Society was held in the city of Syracuse on Tuesday, Wendesday and Thursday, the 11th, 12th and 13th days of September. If the presence of a multitude of the people, so great as to exceed the hopes of the most sanguine of those who had predicted a degree of success hitherto not attained; a throng beyond the population of a great city—a representation, almost by their individual presence, of the farmers of the State; if this is an evidence of the confidence reposed by the people in the conduct and efforts of the Society, then indeed this Fair has been an occasion, to which, not alone the officers and members of the State Society can look with grateful pleasure, but one also to which the people may revert, as the indication—of all others

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the healthiest and most desirable in the progress of a nation—that the successful, intelligent and wise culture of the earth, is the employment most in favor with our citizens. This is the great end and aim of the labors of the Society, and the encouragement thus afforded them by their fellow citizens, is appreciated, as an incentive than which no other can be more valued.

It had been known to the Society that the President of the United States had intended during the course of his tour through the Northern and Eastern States, to visit and be present at the Fair; and it had been looked forward to as a most gratifying incident in the history of the labors of the Society. An illness which attacked him during his progress, prevented him from completing his tour, and led to his immediate return to the seat of government. From himself, however, by a most interesting letter addressed to the President of the Society, which will be found in its appropriate place in this record, and from the united testimony of those who were most intimately connected with his person, and acquainted with his views, the gratifying fact was made known to the Society, that it was among the most cherished objects of the tour of the President, to mingle with the agriculturists of New-York, and those gathered at Syracuse by their invitation; that he had looked forward to this event with unfeigned pleasure, and that the cause of agricultural improvement was cherished by him as of the first importance.

This recognition of the usefulness and position of the Society by the Chief Magistrate of the Union, is a testimony which the Society cannot too highly appreciate, whether they consider the exalted official station of the individual—perhaps in all just views of human greatness, the most important in the world, or the great personal worth and illustrious services which distinguish him. The Society cannot but deeply regret that the farmers of New-York were deprived of the pleasure of welcoming at their own festival the President of the Union, and they trust that the intercourse has only been postponed. The Vice President of the United States was present, and took the liveliest interest in the incidents of the Fair. He was welcomed by the officers of the Society, and his presence justly appreciated.

There were several eminent men of the country, who in acknowledging the reception of the invitation of the Society, expressed their earnest approbation of the career of usefulness in which the Society had so

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far progressed, and their great regret at not being able personally to manifest it. Among them, was the late President of the United States, and we doubt not that the publication of the letter received from him will be interesting to all, giving as he does his testimony to the importance of the agricultural pursuits of our country. His lamented death occurred but a short time after this letter was written, and it was probably among the last acts of his life.

NASHVILLE, TENNESSEE, *May 28th*, 1849.

Dear Sir,—I have had the honor to receive your letter of the 26th ultimo, inviting me "to attend the annual show and exhibition of the New-York State Ag. Society in September next, in the city of Syracuse." Taking a deep interest in the progressive improvements in cultivation, and in the success and prosperity of the great agricultural pursuits of our country, in which a majority of our people, of all our states, are employed; it would afford me sincere pleasure to be present on the occasion to which you invite me, and to witness the "annual show and exhibition" of the farmers of New-York, and I have to regret that the distance of my residence from Syracuse, and necessary engagements must deprive me of the pleasure.

I am, with high respect, your ob't servant,

JAMES K. POLK.

B. P. JOHNSON, *Cor. Sec'y N. Y. State Ag. Soc'y.*

It is with pleasure that the Society is enabled to record the presence at the Fair of many of the most distinguished men of our own State and country. The Hon. Henry Clay expressed himself delighted with the results of the exhibition, as at two several visits to the grounds he had an opportunity of examining the display made by the farmers of New-York. The presence of this venerable and disguished statesman was very gratifying to the vast assemblage, and his appreciation of the welcome bestowed upon him was evident. Many other distinguished gentlemen from our own and from other states honored the Society with their presence.

The attendance of the authorities of our own State was peculiarly gratifying. It is by the well-judging and liberal legislative policy which has been extended to the Society, that it has been enabled to place itself in a position of such usefulness; that has given it the means to pursue the investigation of scientific inquiry, to develop the

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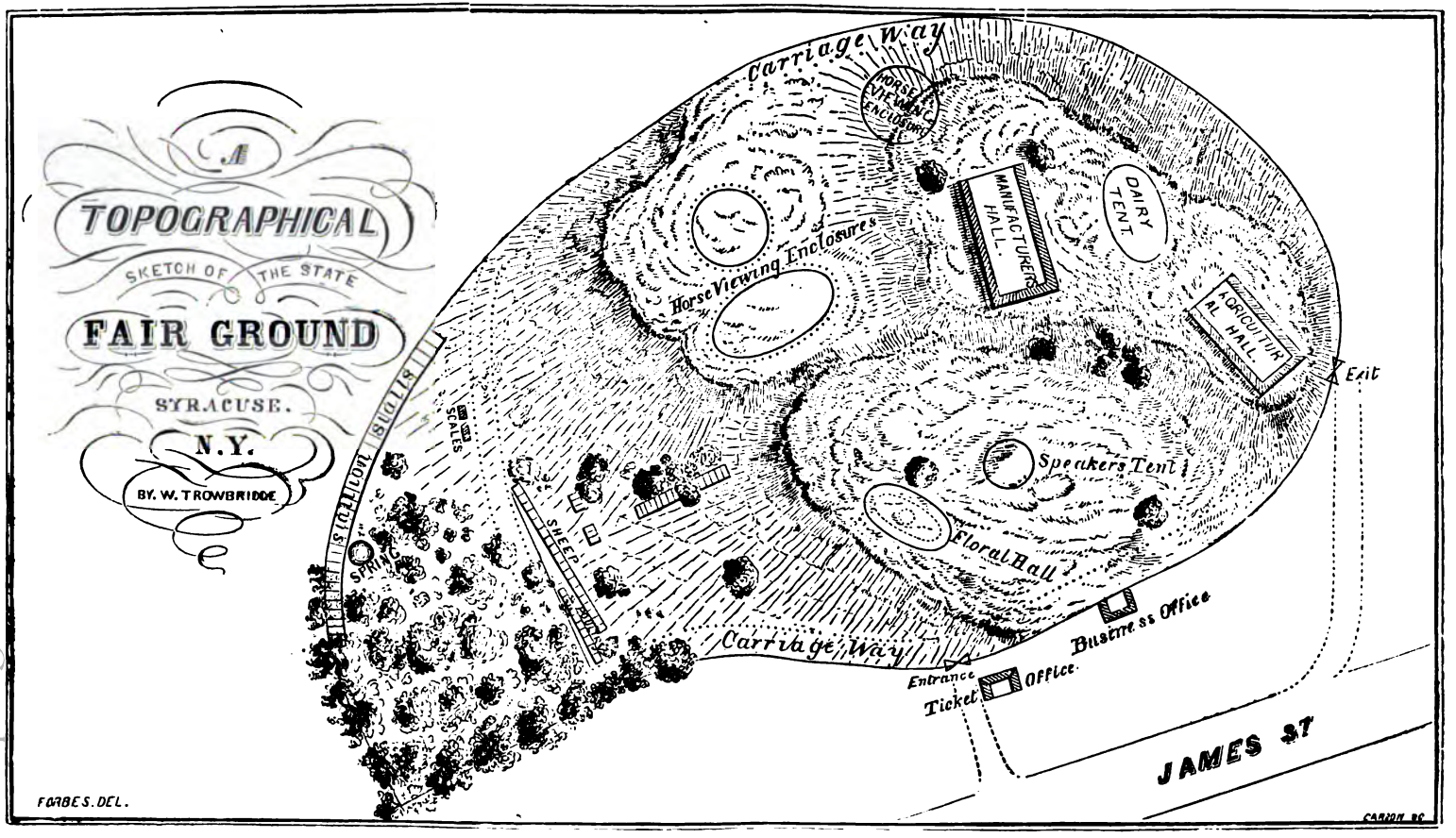

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magnitude of the agricultural resources of the State, to extend to the skilful and thorough farmer and mechanic, inventor, designer and laborer the sustaining, fostering hand of encouragement and reward, and nothing has been more calculated to strengthen the purposes of the Society to efforts of greater usefulness than this fact, that in successive years, those placed in offices and places of authority by the will of the people of the State, have been present to witness the success which has followed the labors of the friends of Agriculture.

Upon this occasion, the Society were honored with the attendance of His Excellency, Governor Fish, Lieutenant Gov. Patterson, the Comptroller, Secretary of State, Treasurer, Surveyor General, Mr. Speaker Hadley, and several gentlemen of the Senate and Assembly. There were also in attendance many of the Representatives in Congress from this State, and from other states of the Union.

The public press of this and adjoining states was fully represented, and through the various public journals there have been spread before the people full and detailed accounts of the articles and stock sent for exhibition, and of the incidents characterizing the fair. In every case, so far as it has come to the knowledge of the Executive Committee, the reports, furnished by these valuable vehicles of knowledge and information, have been distinguished by their eulogy upon the fair, as one of the most successful and important which was ever held in this State. The Society made every arrangement to facilitate the labors of the gentlemen connected with the press, as nothing was more desired by them, than that to the people in every part of the State and country should be known the history of the progress of agriculture, as developed in this association of all that is valuable to the field or home of the farmer. The great cities and the rural districts had each the representation of their journals present, and probably in some form a narrative of the events of these interesting and important three days, has been perused by the great mass of the population of the State and of the Union, and it is hoped, read with satisfaction as a record of the advancement of a good and a great cause.

The grounds selected for the fair were admirably adapted to the purposes of the exhibition. The buildings and fences were substantially made under the directions of Messrs. Burnet and Rust, and the arrangement of the different articles on exhibition constituted much of the good order which characterized the entire proceedings of the fair.

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Floral hall, Mechanics', Manufacturers and Dairy halls, were all arrayed with taste, and the spacious tents used for a portion of the exhibition were found most useful, and better calculated for the display of articles than the spacious buildings erected.

The magnitude of the business to be done in preparing for the Fair, and necessary to be done in the proper arrangement of all its procedure and details, after its commencement, it is difficult fully to present in this report, so extensive and diversified the correspondence, so thorough and minute the knowledge necessary of all the branches of farming and mechanics and artistical labor, proper to be encouraged in order to present a proportionate reward—so numerous the calls for information—unremitting the demand for especial attention to this or that part of the great and extended work, that it is one of the most unavoidable of results that some department shall have been overlooked or neglected. That there has been so little of censure, and so much of kind commendation of the labors of the Society in this respect, is a reward indeed. The business was apportioned in proper divisions and the work of preparation systematized. By such an arrangement only, could the necessary duty be faithfully discharged. The business office at the grounds became one of the most animated of exchanges where the incessant interrogatory made and answer furnished, were of themselves the best exponent of the activity of the three days. The care necessary to afford the proper response in each case was well repaid by the satisfaction evinced by the great number who visited this place of unceasing business.

The importance of a large and extended premium list was clearly manifested. Every department of mechanical industry of the farming economy, was in eager competition, and beyond this, the class of discretionary and miscellaneous premiums, was found so large as to call for unremitting attention thoroughly to examine and decide upon. For successive years, the arm of the ingenious and useful laborer, the accuracy of the artist, the faithful vigilance of the hand that sows and reaps, the skill of the dairy-man, the judgment of the breeder, all these have come up to the annual fairs of the Society, quickened to the exercise of their best efforts by the offered reward, and that, not so much by reason of its intrinsic value, as that it was the testimonial of worth, bestowed by those, who examined accurately before a decision was given.

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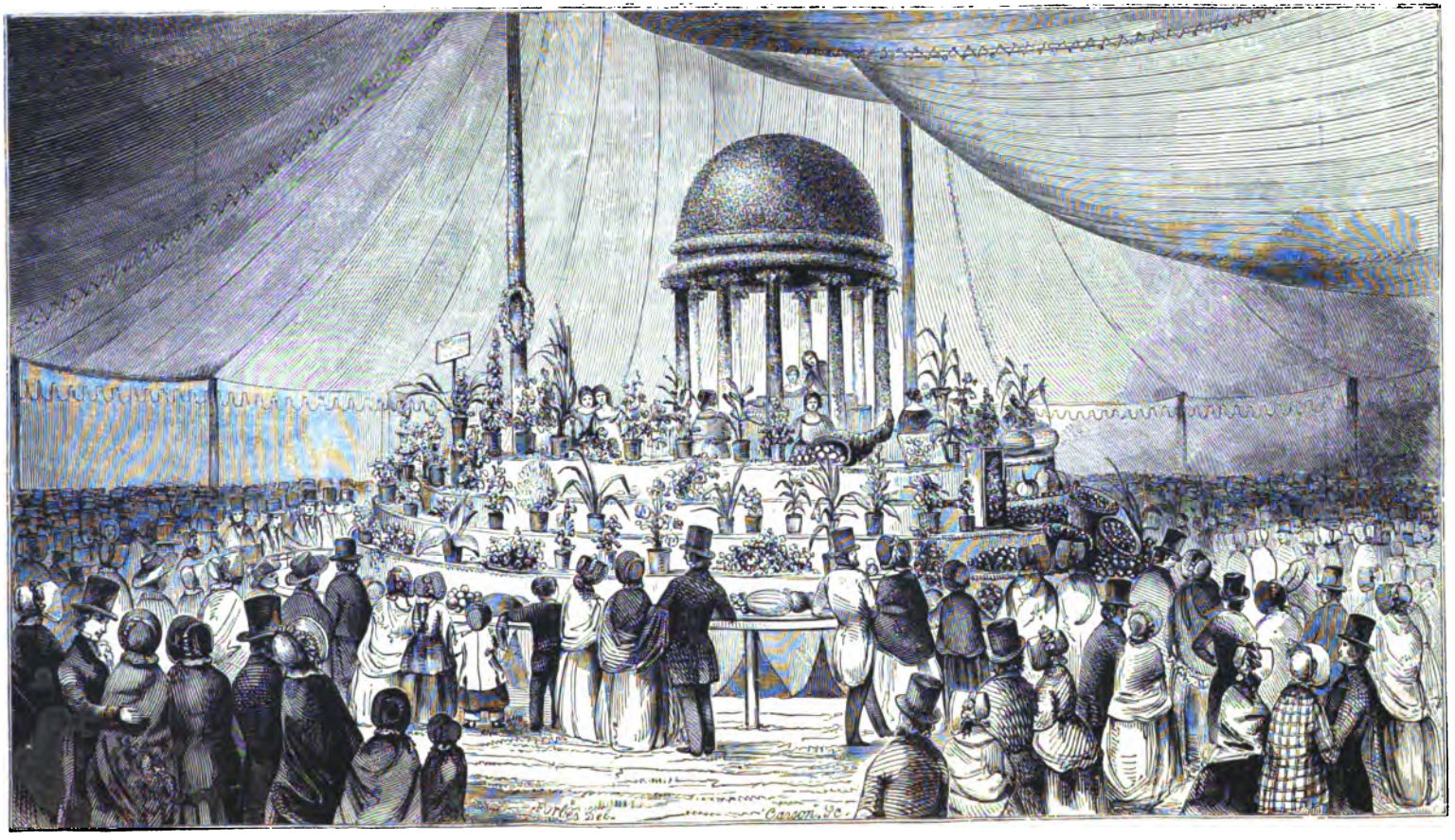

VIEW OF FLORAL HALL.—p. 17.

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The experience of every year enlarges the sphere of usefulness. There are brought into our halls and on our grounds, inventions so useful, fabrics so ingenious, products so worthy, that new recipients of premiums are presented, and thus there is ever coincident, the hand that rewards labor and that which furnishes it. The Fair, the history of which is here given, was eminent in the amount and variety and value of the articles presented in competition and for notice.

The reports of the various committees are herewith presented, and will exhibit in detail the constituent parts of the fair; and the Society acknowledge the obligations which they are under to the intelligent gentlemen, from our own as well as neighboring States, and the British provinces, who acted as judges. To their good sense, clear discernment, and impartiality, exercised amidst all the difficulties necessarily connected with a vast crowd and limited time, the Society owe much of the commendation bestowed. It would be gratifying if more time could be allowed for the discharge of the duties of the judges; but the laudable desire of the people to witness, during the days of the fair, the interesting variety exhibited, renders it extremely difficult to devise any material change of the system pursued.

The Society will never deem their duty fully discharged till every department of work, labor, skill, or science that interests the farmer, or that can make his labor easier and more productive, his home happier and more comfortable, has been presented to the people in such circumstances as best to draw out, sustain, and encourage its usefulness.

The interest of the people in attendance at *Floral Hall* was unusually animated. This portion of the exhibition was arranged by the skill and taste of Dr. Alex. Thompson, of Aurora, to whom the Society have often been indebted for the rich attractions of this department. The hall was crowded during the entire exhibition. The farmers could turn aside from the more practical accompaniments of severe labor, to admire the beautiful flower, the superior fruit. Nor is this without its excellent and gratifying lesson, since it proves that the farmers of our land have learned that the field of Nature's beauty is peculiarly their own, and that they have, in garden and in forest, more pictures as galleries cannot furnish, and which, as it has been well said, it is the highest school of art successfully to imitate. At this hall, as well as the others, the attendance of ladies was very large, showing the interest they take in the exhibition, and they appeared among the most gratified of the assemblage.

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The scene at the great tent, where the address was delivered, will not easily be effaced. The tent was crowded to its utmost capacity, and by as intelligent and attentive an audience as has been witnessed in our country on any similar occasion. The fame of the speaker, Prof. Johnston, had drawn together this large assemblage, and the result proved that their highest expectations were realized. Prof. Johnston was equal to the duties devolving upon him; and though a stranger, from a distant land, the record of his intellectual and personal worth was here before him. He was known as one who had shown to the world the bright chain which connects Agriculture with Science, and has proved the indissoluble bond that binds knowledge to power. His address is among the most valuable papers which are submitted. Its liberal views, its clear judgment, its useful, practical, yet scholar-like characteristics, will win for it a perusal by the thousands who, in this country, are examining with avidity all the pathways which lead to a more intimate acquaintance with the principles which govern the tillage of the soil. The connection of science with practical agriculture receives a new impulse in the arrival on our shores of the distinguished professor who so ably has aided in its practical union in his own favored land. The Society has been greatly honored by his acceptance of their invitation to visit this country and address the farmers of New-York; and they are happy in being enabled to say, that in all respects have their highest anticipations been realized.

Address. The exercises at the tent were commenced by a fervent and eloquent prayer by the Rev. Mr. Pinney, of Syracuse.

The President of the Society, the Hon. John A. King, of Queens, then addressed the Society as follows:

Gentlemen of the Agricultural Society of the State of New-York: In addressing a few words to you on this occasion, I but fulfil a duty assigned to me, and properly belonging to the station with which I have been honored. It is one most acceptable always, and is one rendered peculiarly agreeable to me on this occasion, by the great number of distinguished men of eminence and science, who are acquainted with the great interests of the country, and who have honored this great Fair with their presence. It has been a proud day for New-York, and a proud occasion for the farmers of this great State. When they peaceably assemble and bring together here the products of their enterprize, their labor and their skill; when all

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around is full of prosperity and happiness; when our citizens are assembled here as a society sustained and maintained by the liberality of the Legislature—your own representatives, the farmers of New-York—and offering to the competition of all who come within our borders, premiums of the greatest liberality; it was a proud day for New-York: and may I add, to the citizens of Syracuse also, who have made the arrangements for this great meeting; and the ladies, too, who with their skill and taste have added to that which the intelligence and liberality of those citizens have given us. They have performed all we expected, and have nobly, an hundred times over, redeemed the pledge they gave us.

Gentlemen, I had hoped on this occasion to be able to present to you the Chief Magistrate of the country, the President of the United States, one whose heart was bent on being among you; who told me personally, that he desired to know New-York, its people, and all belonging to its great interests, and who regretted deeply that he could not carry out his purpose. The state of his health has since obliged him to return without accomplishing the purpose for which he left home; and I cannot better express the sentiments of the distinguished gentleman, than by reading to you the letter he did me the honor to address to me on this occasion.

NIAGARA FALLS, *Sept.* 5.

My Dear Sir,—I hope that no one in attendance upon, or in any way interested in your great Agricultural meeting at Syracuse, will suffer a disappointment proportioned to that which I experience in being compelled to relinquish the idea of being present myself.

In addition to the pleasure of meeting so vast an assemblage of my fellow citizens upon an occasion so interesting to all who appreciate the true sources of national prosperity and greatness, I have been anticipating gratification and instruction from this highly favorable opportunity of looking upon the products, implements and improvements of a pursuit in which I have ever taken a deep personal interest.

To attend this Agricultural Fair, was the prominent object of my visit to your state, and until the last moment I have encouraged the idea that I should; but the advice of my medical attendants, and the claims of business in the capital, render it advisable for me to relinquish my wishes upon the subject.

Z. TAYLOR.

I have but one word more to say in conclusion. Gentlemen, I de-

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sire to express the obligations of our society, its deep obligations to the distinguished gentleman who sits by me, Prof. Johnston of England, who upon the invitation of the society has thought proper to cross the broad waters of the Atlantic to come here and give us the benefits of that science and instruction which he has so well imparted to the people of his own land. His books and lectures are text books on agriculture there, and will doubtless be here. He has the skill to apply all the science belonging to it in a sound and practical manner, and that which eminently fits the people of this land. I cannot do better than now to present this gentleman to you, and I do so with great pleasure.—[Cheers.] Professor Johnston then rose and delivered his address, which will be found at the close of the proceedings.

Hon H. WAGER, at the conclusion of the address, moved that the thanks of the Society be returned to Prof. Johnston, for his eloquent address, and a copy be requested of him for publication.

A VOICE; Not to the Society alone, put it to the assembled people of New-York!—[Cheers.]

The question was then taken, and the motion agreed to by acclamation, loud and prolonged.

Prof. JOHNSTON; I beg to return my thanks to you, as the representatives of the people of New-York, and to say that nothing will give me greater satisfaction, than to place my manuscript in the hands of your Committee, for any purpose whatever.—[Cheers.]

COL. KIRBY. It was a theme of melancholy reflection to the officers of the Society, that they missed from among their number, one, whose presence at the Fair, held in his own vicinity, and where he was recognized as among the most valuable of citizens and agriculturists, had been confidently expected. The loss of Col. Kirby, was sincerely mourned, and by none more than by those with whom he was associated in the promotion of whatever could do good to the farmer. His memory as a gallant soldier, a valuable citizen, and sagacious farmer, will be fondly cherished by the farmers of New-York.

LEWIS F. ALLEN, from the committee appointed for that purpose, submitted the following report and resolutions, which were adopted unanimously:

Mr. President. There are events which occur in the progress of all institutions, however prosperous their general career, which sadden the heart, and for a time throw the veil over the most cheering anticipations and enjoyments of their members. Such an event has fallen upon this Society.

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In the midst of our preparations for the great agricultural anniversary, which is now about to close, death has entered our ranks, and taken from us one of the friends, one of the most attached supporters, and one of the most valuable and efficient officers of this Institution. On the 20th day of last month, Colonel Edmund Kirby, a distinguished officer in the army of the United States, and late Vice President of this Society, died at Avon Springs, of a lingering and painful disease, which he had contracted during the late campaign of our army in Mexico.

Col. Kirby, was born in the State of Connecticut, and entered the army at eighteen years of age, in the war of 1812, where he soon became distinguished in all the qualities, which become the soldier, and adorn the man. He was afterwards adopted into the military family of the late Major-General Jacob Brown, commander-in-chief of the army, whose daughter he subsequently married. In 1824, he became a resident with his family, of the county of Jefferson, in this State, where his surviving family still remain. Although in the discharge of one of the most responsible public duties, that of pay-master, he early attached himself to the peaceful pursuits of agriculture, and devoted the occasional interims which the duties of his office would permit, to the cultivation of an extensive farm, in the prosecution and improvement of which he took the greatest delight, and in the welfare of his immediate section of the State, in the promotion of all those local public works, which could most effectually develop its resources; while among the immmediate community in which he dwelt, he has ever been active in all the good offices which distinguish the kind neighbor, and the upright, and public spirited man.

As a most affectionate husband and father, charged with the cares and responsibilities of a numerous family, his death is an irreparable calamity, and to those relatives dependant upon his aid and counsel, the loss of a constant friend and benefactor, will long be deplored.

To this society, Mr. President, the death of such a man as Col. Kirby, leaves a void most painfully felt, and not readily filled. On every occasion of our public meeting, when not occupied in the discharge of his immediate official duties, he was at hand to cheer us by his presence, and aid us with his counsel. He was appointed a member of one of your important committees, on the present occasion, and to the discharge of its duties, he looked forward with his characteristic promptness and energy.

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As a public officer no man in the army of the United States sustained a higher reputation in all the qualities, which elevate the soldier and grace the gentleman. That he was a brave man, the united testimony of the distinguished general officers with whom he served, is the living record. That he was an honorable man, the unsullied reputation of his whole life, bears eloquent witness. That he was an honest man, the faithful application of the millions of public money which has passed through his hands, will answer; and that he discharged all the other great and responsible duties of an American citizen, both in public and private life, which made him an ornament and example to us all, the sorrow with which his death is mourned, is his best eulogium.

Such, Mr. President, was Edmund Kirby. May his example stimulate us to perseverance in good and honorable works, as citizens and as men. I offer the following resolutions:

Resolved, That in the death of Col. Edmund Kirby, this society has lost an early, a zealous, and a most active member and friend—one to whom it is greatly indebted for its prosperity, and whose name will long be cherished by its members, as one of its distinguished ornaments.

Resolved, That we tender to his bereaved family, our liveliest sympathies on this melancholy occasion; and we trust that He who "tempers the wind to the shorn lamb," the God of the widow and the fatherless, will sustain them under this, their extremity of affliction.

Resolved, That a copy of these resolutions with an appropriate letter of condolence from the president and corresponding secretary of the society, with the official seal of the society affixed thereto, be transmitted to the widow and family of the late Col. Kirby.

In pursuance of the above resolutions the annexed correspondence was had:

Syracuse, September 13th, 1849.

MRS. KIRBY:

Madam—We beg leave to transmit to you the enclosed preamble and resolutions adopted at the annual State Fair held at Syracuse on the 13th inst. In fulfillment of this duty, we cannot permit the opportunity which it affords, to pass, without expressing to you the sentiments of perfect regard and esteem which ever marked our personal intercourse and acquaintance with Col. Kirby; and how deeply we

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feel and deplore in his loss one endeared to us by every manly quality; and to our society, by his early, steady, and intelligent co-operation and assistance. Accept, madam, our unaffected sympathy in this your sad bereavement, and believe us,

With sincere regard and esteem,

Your ob't servants,

JOHN A. KING,

Pres. N. Y. State Ag. Society.

B. P. JOHNSON,

Corresponding Secretary.

Brownville, Oct. 9, 1849.

JOHN A. KING, Esq., *Pres. N. Y. State Ag. Society,*

B. P. JOHNSON, *Corresponding Secretary,*

Gentlemen—Allow me in behalf of my mother and her afflicted children to tender you and those you represent, our thanks for the sympathy evinced by the resolutions adopted at Syracuse, and for the accompanying letter, which came to hand a few days since. Nothing softens the pangs of a bereavement such as ours so much as the knowledge that he who has departed, went down to his grave full of honors and mourned by all who knew him.

Accept our thanks, and believe me, gentlemen, yours, &c.,

JACOB BROWN KIRBY.

After Mr. Allen's report, the awards of the committees were read and the society adjourned.

The results of this Fair are to the society a great incentive for vigorous and renewed exertion. There is yet a great field to be occupied. The wealth of the agriculture of our State, of what it is, and may be, is but uncovered. It can only successfully be fully developed in all its richness by the arduous and untiring efforts of scientific research, combined with sound discretion in the practical agriculturist, in the various operations necessary for its full accomplishment. To the attainment of this great end—the efforts of the society are continually directed—happy, if by any action of theirs, the happiness of the people, the legitimate end of all human organization, can be promoted.

The receipts of the Society have been from all sources $12,674.44, payments $10,573.14, leaving a balance in the treasurer's hands of $2,101.30. The funds of the society invested are $7,000.

B. P. JOHNSON, *C. Secretary.*

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THE STATE OF AGRICULTURE IN EUROPE.

AN ADDRESS,

By James F. W. Johnston, F. R. S., S. L. & E., Honorary Member of the Royal Society of England, and Author of "Lectures on Agricultural Chemistry and Geology."

Mr. Chairman and Gentlemen: One of the first lessons a European has to learn after he has landed on the shores of this new world, is to dispossess his mind of all those associations, rich and rare, with which the history of past ages has connected the names of remarkable places. In passing through New England it was my fortune to stop at towns and villages called by names long familiar to my ears—the sounds of which seemed to say, "in a few hours or minutes you will arrive again at your own home and hearth."

But in travelling from Albany to this place, I have met with people fresh from Troy—I have come through Utica and Rome—and from the lips of children have heard of other mighty cities which our earliest European lessons clothe in the hoar of remote antiquity, and illuminate with the glory of immortal deeds. In the desire thus to connect your new towns with the recollection of famous actions, I would read an admiration of the actions themselves, and secret aspirations after similar renown.

In the old world, I have just left, there exists an ancient Syracuse, rich in all those bounties of heaven, which especially favour the husbandman—a genial and sunny clime—clear, blue skies, balmy air and never failing dews—a soil fertile in oil and wine, and abundant in corn, almost beyond belief.

Thousands of years ago, when no Saxon or Celtic foot, not even that of the roving Northmen, had yet trodden the American shores, this ancient Syracuse was the capital of a kingdom of six millions of souls; and though it had so many mouths of its own to fill, the produce of its

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teeming soil left still a large surplus for exportation. An energetic people, comparatively free—unbroken in spirit by frequent wars, by foreign conquerors, and by the degradation and oppression which afterwards beset their domestic hearths—availed themselves to the utmost of the bounties of nature, and by patient industry made their country the "*horreum Romanorum*," and in the language of Livy, "*populo Romano, pace ac bello fidissimum annonæ subsidium.*" Now cast down and degraded, the successors—scarcely to be called the sons of the same people—languish in comparative indolence: and though the bounties of nature are ever fresh and new as in its palmiest days, there are few countries in which agriculture and the arts of life are in a more debased condition than in modern Sicily.

But time, which has wrought this melancholy change, has caused others more cheering to happen too. It may be, that amid the ruins of old Syracuse its ancient fires still live, on some future day to be lighted up anew, and more successfully, into a steady and enduring flame, which the foot of despotism shall never again be able to trample out. But however this be, it is gratifying to me to see—as it must be to you—that in a new country, peopled by a new race, a younger Syracuse has sprung up, emulous of the worth and glory of the ancient—nourished by free institutions—carried forward by the untiring energy of the Teutonic blood—above all, emulous of the agricultural renown of the Syracuse of distant times, and by the application of more mind and knowledge, to a less exuberant soil in a less favored clime, bent on creating a new granary of the nations, an unfailing western store-house to a great and growing people.

It is a happy omen to me, coming among you for the first time, that I should meet with you to discourse upon scientific agriculture, in a city which recalls the vast fertility of the plains and slopes of Sicily—may the modern name like the ancient, descend to after times, associated with ideas of rich cultivation and prolific fields of corn!

It is not without anxiety, as you will suppose, that I appear for the first time before a large trans-atlantic audience. But though you are American born, gentlemen, your faces are familiar to me. They tell me you have Scotch and English hearts, and I believe I may throw myself confidently on your kind indulgence.

I cannot presume to address you on the general importance of agriculture; its fundamental connection with the welfare and power of every state; the estimation in which it has been held in all ages and among every cultivated people; the natural proneness of man to till the soil; the pleasure with which the most talented men, and the high-

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est in station, have always looked forward to the time when leaving business and profession and the cares of office to younger men, the small farm should alone employ their quiet leisure; nor upon the greater attention and respect which this art and its cultivators now every where demand, and are every where receiving. These topics are familiar to you, and you are too rich in native talent to require a stranger to address you on generalities like these.

Nor does my very recent arrival in the United States, entitle me as yet to speak from my own observation upon the existing condition of agriculture on this side of the Atlantic. I have selected, therefore, as the subject of my present address, the existing condition of agriculture in Europe.

There are two very different ways in which I might bring this subject before you. I might illustrate in the abstract, the amount of practical and scientific knowledge which Europe possesses in regard to each of the departments of rural economy, which its climate enables it to prosecute. Taking the methods of the best practical men, and adding to these the knowledge of those most skilful in theory, I might present to you a picture every detail of which was true, but the effect of which as a whole, would be to convey to you a most exaggerated idea of the actual condition of the art—even in Great Britain, where both in theory and practice it is supposed to be best understood, and most skilfully carried into operation. Or I might take you from country to country, and show you as we passed hastily along, the character of its rural population, the excellencies or defects of its cultural practices, the condition of its arable soils, the qualities and treatment of its cattle, and generally what is doing by governments and people in each country for the improvement of the rural arts. I should thus set before you a series of pictures, true, not only in detail, but in their general effects upon your minds, though not partaking of those broad and comprehensive views, which a sketch of European Agriculture, as one whole, would be expected to present.

I propose, to some extent, to follow both methods. After a brief outline of the state of practical agriculture in the leading countries of Europe, derived chiefly from my own observations, I shall endeavor to give you an idea of the position in which agriculture as an art now stands—of what is doing to advance it—and especially of the aids which science is now lending to the practical economies of rural life.

SWEDEN.—Commencing in the north of Europe with the Scandinavian peninsula, I would remark, that in Sweden—especially since the accession of the late king, Carl Johan, better known by the name of

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Bernadotte—much attention has been paid to agriculture. The improvement and increase of the flocks of sheep for the growth of wool, the introduction of better breeds of stock, of newer implements, and of an improved rotation of crops—have successively received much attention; but of late years the great force of the people has been expended on the drainage of the lakes and marshes with which the country is so plentifully studded over. The agricultural societies of the provinces, in conjunction with the Academy of Agriculture in Stockholm, have devoted much pains to what may be called the arterial drainage of their several districts; and though the more refined method of improvement, known in Great Britain by the name of *thorough drainage*, has not as yet been any where introduced, it is only just to to the energy of Sweden to say that no European people, in proportion to its natural resources, has done more during the last twenty years in the reclamation of improvable land from the dominion of overflowing water.

Further advances also are secured by the translation, especially from the English, of the best works on scientific agriculture, under the auspices of the Academy of Agriculture, and by the establishment of agricultural schools and model farms, one of which each province is expected in a few years to possess. Thus in Sweden, as in all other countries, the period of improvement by mechanical means will be succeeded by one of improvement by chemical means—the nature and economical application of which latter means, books and schools will have taught, when the time for more generally applying them shall have come.

Russia.—In Russia, agriculture as a whole is in a very imperfect condition. Here and there, especially in the neighborhood of large towns, like Moscow and St. Petersburg, laboriously and skilfully cultivated fields may be seen, while herds of improved Swiss and short-horned cattle are carefully reared on the domains of the rich nobility. The Emperor also, who knows well the importance of this art to the strength and prosperity of his dominions, sets an example to his subjects by the efforts he makes to introduce a better system of culture among the serfs on the imperial estates, by the establishment of schools for the instruction of farmers in art and experimental science, and by the maintenance of model farms upon the appanages of the crown. But Russia, nevertheless, is half a wilderness. Millions of acres of perpetual forests cover rich soils which there are no hands to till. The value of an estate is measured not by the number of acres it contains, but by the number of souls which live upon, cultivate, and are sold along with

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it. As in the first clearings of a North-American wilderness, where land is comparatively worthless, the soil is cropped till it is exhausted, and then the new land is subjected to the plough and exhausted in its turn. In no country of the world, with the exception of Northern America, is there so vast a field for the useful emigration of agricultural settlers, as in the mighty empire of Russia. But language, and religion, and political institutions, oppose barriers which the Saxon, and I may say the Teutonic races generally, feel themselves unable to overcome.*

GERMANY.—In order to obtain a correct opinion of the agriculture of a country, a man must not only view the country with his own eyes, but his eyes must be taught both what to look for and how to look for it. The reports of travellers who are unskilled in rural matters—the educational institutions of the country itself—and even its agricultural statistics, are all unsafe guides where a really correct appreciation is desired of its true position in reference to this important branch of social economy. This observation is illustrated by the actual condition of the several branches of rural economy when compared with the state of agricultural instruction, and with the attention which has been paid to statistics in the different kingdoms of Germany, and in France.

SAXONY.—In Saxony, a country greatly favored by nature in the character of its soils, the chief attention of the great landholders and of the government, has been long directed to the improvement of the breed of sheep, from which the celebrated Saxon wool is obtained. This kingdom exhibits generally a very different appearance from the neighboring country of Bavaria. In passing from the latter kingdom to the former, "you seem to pass," says Mr. Royer, "from the desert into the land of promise." "Two-thirds of the rich proprietors in Saxony," he observes, "cultivate their own properties, and have established an order, neatness, and method, which, though far from agricultural perfection, you seek for in vain in France."

WURTEMBURG.—In the kingdom of Wurtemburg, where the instruction at the agricultural school of Hohenheim and elsewhere, is better organized, and at this moment more famed, than in any other part of Germany and where, in fact, the art of culture as a whole is the farthest advanced, the general cultivation is described by Mr. Royer as being melancholy, and, at a distance from the capital, very different from what the eulogies of authors had led him to suppose.

BAVARIA.—In Bavaria we find an imposing array of institutions and

* For information on the state of agriculture in Russia, see also a paper by the Hon, Mr. Slocum, in the transactions of the N. Y. State Agricultural Society, for 1848, p. 638.

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means of instruction, specially provided for the rural community, which are fitted to impress the superficial observer with a high idea of its agricultural condition. As in Wurtemburg, there is a central school of agriculture. There are also chairs of rural economy in the universities, and more than twenty chairs of agriculture in the seminaries and polytechnic schools of the provinces, besides a general agricultural society, counting more than 8,000 members. These facts convey the impression of much zeal on the part of the government; much interest in agriculture on the part of the people; and an advanced state of the art of culture in the kingdom generally. But "the miserable aspect of Bavarian agriculture would lead one to suppose that all these means of encouragement are very inefficacious." (Royer.)

The schools are badly organized or conducted. The great landowners are indifferent on the subject of agricultural improvement, while the miserably defective condition of the roads and other means of internal communication indicate, that even the government which has organized all the formal apparatus we have mentioned, is not itself alive to the most fundamental element of agricultural progress.

Prussia cannot boast either of its practical agriculture, or of its system of agricultural instruction. It is a proof of how very little has in past ages been done in the way of teaching the rural population in the principles of the art of culture, that Prussia should so long have derived an undeserved celebrity from the existence of a private agricultural school at Mögelin, established in 1806, and conducted till his death in 1819, by the distinguished Von Thaer. After his death the school he had founded was made a royal academy, and is still in existence. It contains at present only twenty pupils; and even in Von Thaer's time it never contained more than thirty-four. In the much praised primary schools of Prussia, a little instruction in gardening is the only teaching which bears an immediate relation to the future occupations of the rural population.

In the nature of its soils, indeed, which are sandy, light enough to be blown by the winds, and apparently almost sterile, Prussia has much to contend with. This is especially the case in its more ancient and central dutchies. Westphalia and the Rhenish provinces are naturally richer, and are also more advanced and better cultivated.

Besides, until the revolution of the past year, the burdens or servitudes upon land, of a feudal kind—and of which in the New World you have no examples, except a few of a milder form in the seignories of Lower Canada—were so onerous and so unequally distributed, as greatly to retard the development of its agricultural capabilities. The

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state of the roads and other means of communication also, as in Bavaria, and the scarcity of large towns, have concurred with other causes, in retaining the agriculture of Prussia in a very backward condition.

HOLLAND.—If from the uplands of Germany we descend to the lowlands, and especially to that country which includes the islands at the mouths of the Rhine and the Scheldt, and the low country stretching northward to the Zuyder Zee and the Dollart, we shall find reason to stay our steps and to consider calmly the cause, and purpose, and extent of the wonderful system of canals and embankments which the kingdom of Holland presents.

In a sketch of European agriculture, indeed, Holland is deserving of distinguished mention. Above all other European people, the Dutch, though slow, have been patient and persevering in their agricultural labors. Occupying a few more elevated and fertile alluvial spots, in the midst of downs and bogs, and marshes and lakes, and the endless ramifications of many rivers, they have century after century struggled against nature. Draining marshes, pumping out lakes, damming back seas and rivers, reclaiming bogs, fixing by art the wandering downs, interlacing their country with an interminable net-work of gigantic canals;—by such labors as these, they have extended the productive surface of their country, secured its possession, and made its natural riches available. And what makes their praise the greater and more deserved, is the constant watchfulness and care which the retention of their country demands. Exposed on the average of the last thirteen centuries to one great sea or river flood, every seven years, the possession of the land they have gained is never secure. Lying below the actual level of the sea, large tracts of it are only preserved by the huge dykes that surround them, and to maintain these dykes requires unceasing vigilance, and a large yearly expenditure of money.

And though in times past the Hollanders have done great engineering works, yet the spirit of the sires has not degenerated in their living sons. The draining of the Haarlem lake, now in progress, is the boldest mechanical effort ever yet made in the cause of agriculture in any country, and promises to add no less to the material wealth, than to the engineering and constructive fame of the United Provinces.

I feel a pleasure in thus adverting to the impression made upon my own mind, during my various tours in Holland, in the presence of a meeting of agriculturists, many of whom may inherit from the early settlers of New-York, a portion of that industrious and patient blood, which makes every end sure to the determined and persevering man.*

* For a fuller account of the *Rural Industry and Drainage of Holland* which I wrote for the Edinburgh Review, see vol. 86, p. 419, of that work.

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I may mention as an indication of the early desire of the Dutch authorities to promote the diffusion of agricultural knowledge, that a very old regulation prescribes attendance on agricultural lectures as a necessary branch of study to the established clergy of Holland.* And though in that, as in many other countries, men of the old school at present act as a drag on the progress of scientific agriculture, yet enlightened and zealous minds are at work in various parts of the Netherlands, and advance is gradually being made. The name of MULDER ought especially to be mentioned as most eminent among the scientific men of Holland, not only in advancing pure science, but in advocating and promoting its general applications to the agriculture of his native country.

ITALY.—From Holland turn for a moment to Italy, in which country drainage works somewhat akin to those of the Dutch, form the proudest monuments of which even that famed land can boast, of the victory which persevering intelligence can achieve over the difficulties and seeming hostility of nature.

Did time permit, I might present to you a most interesting historical sketch of the changes in agricultural condition and capability which that country has undergone from the period of the ancient Etrurians to the present day. And to the man of science, such a sketch would be the more interesting, from the circumstance that in all the changes which have taken place, the physical and geological structure of the country, has exercised a far more prominent and permanent influence than either the remarkable industry and constructive skill of the Etruscan inhabitants or the hostile incursions of its foreign invaders.

To the rich alluvial plains of Lombardy, of which rice and Indian corn, and wheat and abundant milk, are the natural productions; and to Tuscany, in which something of the ancient industry and persevering practical skill of the old Etrurians† still survives, the agricultural enquirer must proceed to see the bright side of Italian cultivation.

But it is in Tuscany chiefly that he will find the most interesting evidence of the conquering power of the living mind over the obstacles of physical nature. The Marremme of Tuscany and the marshes of the Val di Chiana, like the Campagna and the Pontine marshes of the Roman dominions, have long breathed forth that pestilential malaria, which

* This must be considered an admirable provision, enabling the pastor to advise in regard to the temporal pursuits, no less than the spiritual affairs of his flock.

† To those who are desirous of obtaining the means of forming clear notions of the physical structure of Italy, of its climatic conditions in the times of the ancient Etrurians, and of the industrial skill as well as the social relations of this people, I venture to recommend a perusal of Denis's *Cities and Cemeteries of Etruria*.

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like the summer exhalations of the sea islands and river mouths of your Southern states, carries on its wings fever and lingering ague and frequent death. It is one of the great modern triumphs of engineering skill, applied to the promotion of rural industry—second only to the gigantic labors of the Dutch, of which I have spoken, and to the artificial drainage of our English fens—that the terrors of the Maremme have in a measure been bridled in—that the Val di Chiana, in so far as it lies within the borders of Tuscany, has been drained and dried—and that cheerful health and rich crops prevail over large tracts of country, in which it used to be almost certain death to linger.

Among a Republican people, I, who owe allegiance to a constitutional Monarchy, may be permitted to name to you Leopold the First, of Tuscany, as the principal author of all this good. Whatever our opinions on other matters may be, we shall all, I am sure, agree in this, that those men are great and worthy to be honored, who having been gifted by God with large means and great opportunities, make use of those means and opportunities for the glory of God and the good of their fellow creatures—who, instead of war and scarcity, and suffering and death, promote peace and plenty, and health, and the multiplication and prolongation of human life—the moral lesson of whose life inculcates the truth that man's proudest triumphs are not those he achieves over his fellows, but those which he gains over himself, or by which he compels the unwilling powers of nature to minister to the material comforts of mankind—who encourages what will unite instead of distract, what will cement instead of divide the nations of the world—as that broad belt of water which laves alike the shores of your country and mine, instead of separating, as in former years, now binds us together more closely than if the same continent contained us.

As the promoter of such ends for twenty-five long years in his country of Tuscany, the name of Leopold the First will not sound unpleasantly even in your republican ears.*

FLANDERS AND BELGIUM.—In Flanders, both Belgian and French, you are probably prepared for an admission on my part, of great agricultural skill and success. I am compelled, however, to confess my own impression to be, that a great portion of what has been written upon Flemish husbandry, partakes of the character of a romance.†

* For an account of the reign of Leopold, see Napier's Florentine History, Vol. VI, and for a detail, with drawings, plans and maps, of the engineering operations by which the Maremme were dried, see *Memorie sul Bonificamento delle Maremme Toscane*, by Fernando Tarlini, Florence, 1838.

† *L'Agriculture Pratique de la Flandre*, par M. J. L. VAN AELBROECK, Paris, 1830, and *Memoire sur L'Agriculture de la Flandre Francaise et sur l' Economie Rurale*, par J. CORDIER, Paris, 1823.

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The cultivators of Belgian Flanders have the merit of raising fair crops from certain tracts of poor and sandy soil, of husbanding and applying manures so as to keep such land in culture, and of skilfully varying their crops so as to prevent a premature exhaustion. But no knowledge of the general principles of agriculture is widely diffused among them. The improvement of wet and heavy clay soils, except by open ditches, is almost unknown. Improved implements and thorough drainage, and modern modes of manuring, and some small instruction at least in the elements of science as applied to agriculture, have still to be introduced among them, before they can rank in general knowledge or in skilful practice with the farmers of Scotland or England.

And, indeed, in Belgium as in France, the progressive subdivision of property opposes a growing obstacle to that general amelioration of agricultural practice, which the wants of a numerous people and the progress of knowledge demand. Where the average extent of properties and farms over a whole province is already reduced to about an English acre, we cannot look for the introduction of any of those improvements which demand the purchase of new or comparatively costly implements, the rearing and feeding of multitudes of stock, the employment of hired labor, or generally the application of capital to the land. As in Ireland, the subdivision or morcelling of the tillage farms, has already, in whole districts, been carried to the starvation limits. As into Ireland, the potato failure brought with it into Belgian Flanders, famine and disease, and large emigration,—and notwithstanding all that wise governments can do, it is to be feared that on the recurrence of similar visitations, similar social evils will in both countries again re-appear.

France.—In France I need hardly inform you that practical agriculture is far in arrear. In Normandy the mixture of Teutonic blood has probably some connection with the superiority of the husbandry of this province as compared with most of the other parts of the kingdom. It is certain at least that notwithstanding the many efforts made by persons in power to promote the introduction and adoption of better methods, the general farming of La Belle France advances with comparative slowness.

This country indeed presents another striking instance of the small connection which may exist between the existence of extensive means of agricultural instruction, provided by the central government, and the practical skill of the rural population.

In 1843 there existed in France one hundred and fifty-seven agricultural societies—six hundred and sixty-four agricultural committees—

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twenty-two model farms, some of which had schools attached to them —and fifteen schools and chairs of agriculture and agricultural penitentiaries. In the early part of 1849, under the auspices of the republican government, and as a part of the plan of M. Fouret, then Minister of Agriculture, twenty-one farming schools had already been opened—a national agricultural university was about to be established on the farms in the little park of Versailles, and a hundred and twenty-two agricultural societies, and three hundred minor institutions, had participated in the funds voted for the encouragement of Agriculture.

Though it is unquestionable that a country may attain a high rank in agriculture without the aid of formal agricultural schools—provided, as in Scotland, other early mental training is placed within the reach of the rural population—and that in spite of numerous schools, if other obstacles intervene, the cultivators of a country may lag far behind;—yet both common sense and experience show that of two nations of the same blood, placed otherwise in the same circumstances, the one which teaches the principles of agriculture in its schools, will exhibit the most productive harvests on its fields; and that, as in England and Scotland now, a time will come in the agricultural history of every country, when old means and methods will fail to maintain the rural community in a flourishing condition, and when every new means of fertility which advancing knowledge can supply, must be made generally known, and become generally employed. Such are the simplest and most common sense arguments in favor of agricultural teaching—the inutility of which might be argued with some show of reason, from the comparatively small progress yet visible among the fields and farmers of France and Bavaria.

The agricultural statistics of France, which the government has collected and published in great detail, would supply many interesting subjects of reflection, were I at liberty to dwell longer on this part of Europe. I may only mention—as pregnant with thought and instruction in regard to the condition, the food, and the general mode of living of the rural classes of France—the fact, that the number of conscripts who are rejected on account of deficient health, strength and stature, is constansly on the increase; that forty per cent are turned back from this cause; and that though since 1789 the standard has been three times reduced, as large a proportion of the conscripts is below the required height, (now five feet, two inches,) as ever.—(Rubichon.) Such facts as this show how closely the discussion of agricultural is connected with that of the most profound social evils.

SWITZERLAND.—To Switzerland, I only allude as one of those coun-

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tries in which the influence of natural intelligence and a fair share of early instruction, has been brought to bear most successfully on the improvement of the soil, and especially of the breeds of stock which are best adapted to its peculiar dairy husbandry. Those advances which require the application of capital and science, such as thorough draining and special manuring, are there, however, still unmade; and it will probably be many years before, in these respects, the cultivators of the Swiss vallies and mountain slopes, can closely imitate the present improved practices of the British Islands.

Spain.—The agricultural condition of Spain, suggests melancholy reflections. The central table lands of this country * are reckoned among the finest wheat growing districts in the world. The culture is rude and imperfect. The soil is scratched with a primitive plough, and is seldom manured, yet the returns are said to be prodigious, and the quality of the grain excellent. But where nature does much, man too often contents himself with doing little. Amid all this plenty, the peasant is miserable. He lives in a cabin of baked mud, or in burrows scooped out from the friable hillocks, ignorant of the luxuries of furniture, and barely possessing the necessaries of life. The want of roads and of means of easy transport, makes his produce almost worthless, so that a comparatively spare population exists, and much wretchedness in the centre of fertile fields and a land abundant in corn.

We sometimes think ourselves unfortunate to have been born, or to be doomed to live where clouded suns impart a lessened light and heat, or where the frosts of winter bind up for many months the hardened earth. Yet in such climes, man more really lives, and exercises a truer dominion over inanimate things, than where tropical skies appear to prepare for him an unceasing enjoyment. Where mind and mental energy are dormant, he only vegetates or exercises his brute passions. Where by perpetual struggles he subdues the adverse elements, bends circumstances to his will, forces a copious abundance from an unwilling soil and in spite of inclement seasons—there he most truly lives, and amidst his hardships enjoys life most; there refreshing sleep visits him with her balmiest breath, and in the power of mind over matter, which his success displays, he brings out more clearly the claim of man to a likeness with Him who is all mind, and to whose slightest intimation all matter bends.

* The two elevated plains of New and Old Castile, and that of La Mancha, separated from each other by the granites and metamorphic rocks of the Sierra Nevada, are composed of a white limestone, occasionally covered with the drift of other rocks. These plains are burned up in summer, so as to produce no grass till the October rains fall, but they yield magnificent crops of wheat. (Sir E. Head.)

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Great-Britain.—In striking contrast to the case of Spain, is the agriculture of the Island in which I was born, and from which so many of your forefathers have come. I need not tell you of our uncertain climate,—our fickle sky, our frequent rains, our late frosts in spring, our early frosts in autumn, the cold winds and temperate suns of our most favoring summer, the mists and fogs that settle over us at every season of the year. I only remind you of these things, and ask you to contrast with them the large crops we can reap, the high rents we can pay, the poor lands we have enriched, the local climate we have ameliorated, the wide wastes we have subdued beneath the plough, the northern districts we have tamed down to the production of wheat, the large population we have reared, and in ordinary seasons are still able to feed, and—amid all the croakings and complaints of individuals and of classes—the vast amount of material comfort and of intellectual elevation which the island exhibits. How much kinder, on the whole, the Deity has really been to us than to prolific and sunny Spain; how much better our fortunes as a people, how much happier our individual lot?

Practical Improvements in Great Britain.—Among the greatest of those practical improvements *in the treatment of the land*, by means of which British agriculture has been advanced to its present condition, I may mention:

1st. *The alternate husbandry*—a judicious rotation of crops. In this work Flanders was probably the earliest among modern European countries to make decided and important advances.

2d. *The introduction of thorough drainage.*—To a certain extent and in a certain way, under drains have been made in almost every country of Europe, and are at least as old as the time of the Romans. But the necessity and almost universal profit of the system as it is now understood and practiced, was first demonstrated in Scotland, and owes its general introduction to Mr. Smith, of Deanston.

3d. As the complement of thorough drainage, the introduction of *deep and sub-soil ploughing*. These practices have renovated shallow, worn out soils, by bringing up new materials; have opened a passage for the roots to descend deeper in search of food; and have provided a more ready outlet for the surface waters into the drains below.

4th. *The judicious and continued application of lime*—according to principles now beginning to be generally understood. When applied without the requisite knowledge, or without regard to future consequences, the use of lime has been, and will still be, one of the most ready means of exhausting the most fertile soils.

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5th. *The use of Bones*—in various forms, as an application to land in various conditions, and for the growth of various crops.

6th. Generally, what is called *high farming*, comprehending:

a. The culture of green crops extensively.

b. The making of rich home, and the purchase of valuable foreign manures of various kinds to a great extent.

c. The rearing and feeding of improved breeds of stock, for the conversion of one form of produce into another, which meets with a readier market, or is otherwise more profitable.

d. The custom of *full feeding*, both for plants and animals, from early youth to full maturity.

It is the characteristic of this kind of farming, that it spares no reasonable expense—in implements, in manures, in labor—as all experience has shown that a liberal treatment of the land makes the land liberal in return; and that to the stingy farmer, the land is most niggard of her crops.

7th. *The introduction of lighter and better contrived implements*, of machines to economise labor, and of horses having a quicker step.

Such are generally the practical methods or processes by which British agriculture has been advanced to its present condition.

In connection with this improved condition of British agriculture, and the practices it involves, you will excuse me if I advert for a moment to one aspect in which British agriculture may be regarded, which at the present moment is most vitally connected with the interests of the English farmer, and may be neither uninteresting nor uninstructive to you.

Were an intellectual foreigner, previously unacquainted with Great Britain, with the character of its people, or with its social condition, to be informed, regarding this country, that though occupying only a small and thickly peopled corner of Europe, shrouded for many months of the year in fogs and mists, seldom and briefly visited by the fervid sun—never, I may say, by such a sun as now shines upon us—and raising its own grain crops with cost and difficulty, to feed its rapidly increasing inhabitants—were he to be told that the Legislature of this country, in which the agricultural body is the predominating interest, had thrown open its island harbors to all comers, and trusting to superior energy, perseverance, and skill, had invited even the most fertile and favored regions of the globe to a free competition in their own grain markets, fearless of the results; apart from all fiscal theories or political views with which my profession and pursuits forbid me to inter-

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meddle, I ask you if such a foreigner, so instructed, could fail to admire the open boldness, to look with respect on the resoluteness, of such a country, or to long for an opportunity to study, not only the character and habits of its people, but the modes of culture practiced by them with so much success, in a region so unfavored by nature?

And were he actually to come among us, it would be easy for him, having started from the Land's-end, to proceed, from one warm hearted and hospitable farmer to another, till the Pentland Firth arrested his course; and all his journey long he might converse with cultivators of ardent minds, full of practical and general knowledge, who in most unpromising circumstances refuse to despond, and while they see so much everywhere around them awaiting the hand of the improver, will not let slip the anchor of hope; who, differing widely perhaps in politics, and as to the policy of certain fiscal regulations, yet feel alike that to resolute men the conquest of the stubborn land is as sure as the dominion of the sea; that new difficulties only demand new exertions; and that new energies are equal to meet new emergencies.

On quitting the British shores, after such a tour, that foreigner would carry with him a true impression of the flower of English and Scottish agriculturists; and his first admiration of the resolute firmness, and his estimate of the skill of the island farmers, would be confirmed and strengthened by his actual survey.*

In other parts of the world I might fear lest my audience should accuse me of over exalting, by such language as this, the character of my own country and its people. You, who feel so just a pride in the noble land you possess, will know how to make allowance for my pride in mine. But indeed, whatever can be truly said of the spirit and energy of British farmers, may, I begin to feel, already be said, with almost equal truth, of the farmers of your Northern States. Of the West and South I cannot as yet, from personal observation, speak. In Nova Scotia and New Brunswick, two younger provinces, I have seen a picture of what Maine and New Hampshire, and Massachusetts especially, have been; and in the gradual conquest which persevering labor has in these States achieved over drifted rocks and hungry gravels, and sandy barrens and ungenial swamps, I discover the resolute spirit

* For two recent estimates of the condition of agriculture in Great Britain, see—

WECCHERLIN. *Ueber Englische Land-wirthschaft und deren Anwending auf Land-wirthschaftliche Verhaltnisse insbesondere Deutschlands. Stuttgardt and Tubingen*, 1845. And

COLMAN'S *British Agriculture*. London and Boston, 1840.

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still living of those men who, centuries ago, dared to cross a then wide and little known sea, in search of new and freer homes, and whose descendants now till alike the soils of the Old England and the New. Time has not impaired the energy and enterprise of either; I believe I may say it has left their hearts unchanged too.

And now you are ready to ask me, what those, who in Europe are most in advance in the practice of the rural arts, look forward to as likely to help on agriculture still further. In what especially, you will enquire, do we of Great Britain trust, who have thrown down the gauntlet to the farmers of the world? These questions I shall answer by drawing your attention briefly, to what may be regarded as the characteristic or living feature of the agriculture of our time, what you no doubt expect me briefly to speak of, the direct applications, namely, of natural science to the several branches of rural economy.

The main purposes for which natural science is applied to rural economy, are,

First. To explain the reasons of practices already adopted, or of things already observed, and to supplant old and defective by new and better usages.

Second. To establish general principles, by means of which, a short cut is provided for the unlearned, to the knowledge, practical and theoretical, we already possess. A single principle explains and thus recomends or forbids many practices, according to the circumstances of the soil, place or season.

Third. To enlarge our actual knowledge by new discoveries susceptible of practical application.

On these several objects of natural science, in its applications to agriculture, it would be out of place at present to dilate. It will be sufficient if I briefly draw your attention to some of the general results, in reference to rural economy, at which science has already arrived.

With this view I might draw my illustrations from any one of the many different branches of natural knowledge. I might select for example:

1st. The general relations of *Physical Geography*, to the art of culture, such as

a. The influence of broad seas, and of great lakes and rivers, of tides, of sea currents, and of prevailing winds, on the capabilities of a country and the practices and profits of its cultivators.

b. The influence of mountain elevations and depressions, of high table lands and of low level plains, or

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2d. The general indications of *Geology* in regard to the fertility of a country, the branches of husbandry to which it is best adapted, and the means by which its fertility may be best promoted.

The Geological Map of this State, and the volumes of the Natural History Survey, afford abundant illustrations of the relations of this science to practical agriculture, or

3d. The relations of *Meteorology* and *Botany* conjoined, such as

a. The adaptation of certain plants to certain climates, of sugar, cotton and rice to warmer; of buckwheat and Indian corn, and wheat, to warmer and dryer; of rye, barley and oats, to colder and more uncertain climates.

b. The nature of rust, smut, mildew, the maize, brand, &c., and the circumstances of local climate most favorable to their appearance—or

4th. The relations of *Geology* and *Vegetable Structure* conjoined—such as

That certain plants and soils are mutually adapted to each other, because of the special structure and natural habits of the plants, and the physical characters only of the soils.

The Valley of the Mohawk, for example, is remarkably prolific in Indian corn, and raises comparatively little wheat—while the district of Syracuse produces wheat abundantly, and is less favorable to corn. So in Great Britain and Ireland, we have our turnip and barley soils, distinguishable readily, by the practical man, from the wheat and clover soils. These differences are independent of chemical composition, and are not to be explained upon chemical principles. They are dependent upon the special relation which the structure and natural habits of the plants bear to the physical characters of the medium in which their roots are made to grow; or

5th. The general indications of *Geology* and *Meteorology* conjoined—such as

The relations of the nature of the rocks, of the soil, and of the fall of rain taken together—

a. To the necessity for under-drainage, and the means of effecting.

b. To the necessity for artificial irrigation, and the easiest mode of obtaining a supply of water for the purpose; or

6th. The general relations of *Zoology* and *Animal Physiology.*

a. To breeds of domestic animals, and to the preservation of their purity.

b. To the rearing, feeding and general tending of stock.

c. To the agency of animal life in fertilizing the soil.

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d. To the attacks of insects upon our cultivated crops; or

7th. The general indications of *Chemistry*, such as

a. That a fertile soil, in addition to various organic compounds, contains at least eleven different mineral substances.

b. That plants contain, usually, or in most of their parts, the greater number of the same mineral substances.

c. That the animal, as a whole, also contains them, but distributed throughout its several parts in a manner different from that in which they are found, either in the plant or in the soil.

d. That the plant standing, as it were, between the soil and the animal prepares for the latter both its organic and its mineral food.

e. That an intimate and beautiful relation exists between the soil, the plant and the animal—or between the living and the dead things of nature; or

8th. The general indications of *Geology* and *Chemistry* conjoined, such as

a. That certain geological formations are especially rich in some of the mineral substances found in and required by plants, and produce soils which with special treatment, will prove fertile and profitable to the cultivator.

b. That others are especially defective in some of these substances, and form soils which are naturally unproductive.

c. That some abound in all the kinds of mineral matter which plants require, and yet yield soils which are naturally unfertile.

I. Relations of Geology to Agriculture.

From any one of these general topics, I might select beautiful examples of the close bearings of science upon profitable farming—but time does not permit me to illustrate in detail any one of the general relations to which I have referred. A few observations, however, in reference to the special applications of Geology and Chemistry, will neither detain us long, nor prove, I believe, generally uninteresting.

In reference to Geology, I could have wished to point out to you the very close economical connection which recent discoveries have established between practical geology and practical agriculture—how the manufacture and abundance of valuable manures, for example, is actually dependent on the progress of geological discovery. I must be content, however, with a brief allusion to the geology of the United States.

There are few countries, indeed, which more clearly than your own, show the relations which geology bears to agriculture in all its branches. Your wide prairies are naturally distinguished from your vast forest

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lands, by the character of their soils, and these again by the geological structure of the regions over which they extend, and from which they are generally derived. The broad treeless zone of calcareous marl, or rotten limestone—called the prairie or canebrake country—which crosses Alabama in an east and west direction,* owes its natural nakedness to the dry, waterless, chalky deposits, which for a depth of hundreds of feet form the uppermost rocks of the country; and the tenaceous, soapy, unctuous quality of the soils, with which the carriage wheels of travellers in that State, in wet weather, become familiar, is owing to the same cause.

So your zones of differing timber, as you ascend from the alluvial swamps of the shores in your Southern states, across the eocene and cretaceous beds to the mica slate, gneiss and granite of the Appalachian chain, are the consequences and indications of diversities in geological structure. The swamp willow, the cypresses, (*thyoides* and *disticha*) the swamp hickory, the green palmetto, the tall magnolia, the red maple, and the cotton wood of the lowest swampy spot—the hickory, oak, magnolia, beech, walnut, tulip tree, and holly, of the dry alluvial bluffs—the perpetual pines of the tertiary (eocene) sands—the naked prairie of the cretaceous marls—and the mixed oaks, hickory and pines which appear on the primary rocks—all these zones of different timber indicate the natural connection of the vegetation of a district with the nature of the rocks on which it rests.

Nor are these geological relations of vegetable life without their influence on the daily movements of your shifting population. I have elsewhere shown how directly the movements, the natural expansion I may call it, of our first class farmers in Scotland, is not only influenced but actually, as it were, prescribed, by the geological character of the district in which they have been brought up and to which they intend to move.† So it is among you. "Those who who go southwards from Virginia to North and South Carolina, and thence to Georgia and Alabama, follow, as by instinct, the corresponding zones of country. The inhabitants of the red soil of the granitic region keep to their oak and hickory; the "crackers" of the tertiary pine barrens, to their light wood; and those who inhabit the newest geological formations in the sea islands, to their fish and oysters."‡

And to this illustration of a fact which may be proved, I believe, by observation in every country of the globe, Sir CHARLES LYELL adds a

* Lyell's Second Visit to the United States, p. 42, 89.

† See an article in the Edinburgh Review for March, 1969.

‡ Lyell's Second Visit to the United States, p. 110.

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sentence, from which I am sure you will at once draw an important, practical lesson. "On reaching Texas, all these different classes are at fault, because the cretaceous strata in that country consists of a hard, compact, siliceous limestone, which defies the decomposing action of the atmosphere, and forms table lands of bare rock, entirely unlike the marls, clay and sand, of the same age, in Alabama."

The tillers of the red land, of the pine barrens, of the marshy prairies, and of the sea island swamps, are equally at a loss when they migrate to a country of which the soils and surface differ from all they have left. And how is this? Because they have no familiarity with those general principles of chemical science on which all culture on all soils depends—because, if they wish to continue the same kind of tillage, and on soils similar to those they have left, they have not such a knowlege of the general principles of geology as would enable them at once to say, to this or to that country I must go, for there alone am I likely to find them.

In my own country I have been accustomed to press upon the agricultural community, the importance of such geological knowledge to them, because of the numerous colonies we possess in all parts of the world, and because of the swarms of emigrants we yearly send off to subdue and people them.* But to you whom I now address, who already occupy, or in connection with kindred blood are destined to subdue and people, nearly half a world—how much more important must such knowledge be! Your westward movement will continue for many generations, and how much surer will the way to wealth be to your hardy pioneers, if they have been taught in their early homes, not only how to choose land, but where to look for the kind they wish to buy, and how to till it best, whatever it may be, when it has come into their possession.

I ought, perhaps, to apologise for saying so much on this subject. To you, who have expended so much public money, and so large a measure of talent in developing the geological structure and natural resources of this and other states, it may appear presumptuous in me to urge further upon your attention, what you have shown that you already so fully appreciate. I may plead as an excuse, that in a country where all action originates, and all power centres in the masses, a brief discussion of the subject before a great meeting like this, may help new listeners towards a proper general estimation of the practical value of science—and that what I have said will not fail in being useful to scientific agri-

* See the author's *Elements of Agricultural Chemistry and Geology. Fifth edition*, p. 616.

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culture, if it convince a single undecided voter in this great commonwealth of the worth of those aids which science offers you, in developing the resources of the soil.

II. RELATIONS OF CHEMISTRY TO AGRICULTURE.—

Permit me now to say a few words on the subject of chemistry, in its relations to agriculture.

The special applications of this science, as many of you are already aware, are far too multiplied to admit even of enumeration. Of the practical ends which have been more or less perfectly attained by means of chemistry, I might mention such general ones as these:

1st. In what *general* exhaustion consists, how it is produced, and how it may be repaired?

2d. In what *special* exhaustion consists, how it is brought about, either naturally or artificially, and how it is to be corrected?

3d. What plants, in general, require to make them grow well?

4th. What manures ought to contain, to be generally serviceable; what, with a view to special purposes, they ought specially to contain; and how they are to be artificially prepared?

But such topics are too general and indefinite to make a sure impression on the mind of the practical farmer, in the brief moments I have spent in enumerating them.

I mention further, therefore, such special points as the following:

1st. How to bring crops to earlier ripeness in late and elevated districts.

2d. How to reduce the straw producing tendency of the land.

3d. How to hasten or promote, or to push forward laggard, yellow and stunted vegetation.

4th. How to strengethen the straw of your grain crops, where they are liable to be laid.

5th. How to fill the ear and make it larger, where long culture or natural poverty has reduced its size.

6th. How to improve the deficient feeding quality of turnip and other root crops, when grown on mossy land.

7th. To quicken the organic matter in dead, deaf, or peaty soils, and make it available for the nourishment of plants.

8th. To prepare artificial manures, which shall nourish any crop on any available soil.

9th. To promote growth on *slow*, and to retard it on *quick* soils.

10th. On newly brought up subsoils, and on trenched land, what manures ought to be used, and why.

11th. Why a rotation of manures, as it is called by practical men, is necessary and where.

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12th. That the use of lime to a certain extent, and in a prudent way, is necessary to the highest fertility.

13th. That saline and nearly all other manures, do more good upon light and open, than they do upon stiff and close soils, and why.

14th. How to economise the consumption of vegetable food, and to adapt it to the purpose for which an animal is fed.

15th. How to prevent the disease called *fingers and toes*, in turnips and other roots, and how to render mildew and ague equally rare.

To do these and many other things economically, skilfully, and with more or less succes, are among the practical ends to which chemical ininvestigations have already led us.

They also supply answers to many practical questions, such as:

1st. Why cabbage crops so greatly exhaust the soil, and how such exhaustion is to be repaired?

2d. Why tares cut green exhaust the land, and give inferior wheat?

3d. Why tares are seldom good after crops of clover?

4th. Why lime produces a more marked benefit on one soil than it does upon another?

5th. Why one variety of lime is more useful generally, or in particular districts on particular farms and fields, than another?

Of special points and questions, I could enumerate many more, in regard to which chemistry may be said to have been, or to be capable of becoming, of obvious money value to the farmer. Even to such of you, however, as have not much attended to this subject, the above examples will sufficiently indicate both the kind of connection which exists between practical agriculture and practical chemistry; and the kind of uses to which such scientific knowledge may hereafter be put, in advancing the important art, which it is the first wish of this great society, and the individual interest of many of its members most zealously to promote.

Limits of Human Skill.—But in dwelling upon and illustrating what is already in the power of man, and what he hopes to attain in reference to agriculture through the aids of science, I would not forget to acknowledge how very limited his knowledge is, and how feeble his capacities after all.

A mysterious fungus attacks the potato, and for years spreads famine and misery, and discontent and depression, among millions of industrious farmers.

A minute fly, season after season, hovers over our wheat fields, and from entire provinces and states almost banishes the cultivation of our most important grain.

A long continued drought, such as half a century past has scarcely seen, dries up our meadows and pastures, and drives the farmer to his wits end, to obtain winter sustenance for his necessary stock.

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Such things as these ought to prevent us from boasting of our knowledge, and to enforce upon us that piety and humbleness of spirit, which rural occupations themselves so naturally foster, while at the same time they should not restrain us from any effort or enquiry by which the evils themselves may be mitigated or removed.

It is possible—nay, it is almost within the bounds of a reasonable expectation—that the same intellectual research which has given us dominion over the proud waves—has made out the laws by which hurricanes are regulated; has already almost freed us from their most fierce influences, and has forced the fiery lightning to descend harmlessly from heaven—that the same research may finally free us from the visitations of the fungus and the insect, and may place the dreary droughts of summer under reasonable control. Such hopes we may entertain, not as sources of pride, but as stimulants to exertion; for in so greatly rewarding the past exercise of our intellectual powers, the Deity obviously intends still further to excite us to study and extract good from the living and dead things of nature, over which he has given us a general dominion.

OBSTACLES TO PROGRESS.—There are, however, in every country, certain obstacles which oppose themselves to the progress of scientific agriculture, as a branch of knowledge, or to its practical application in the improvement of the soil.

I do not refer to those physical or local obstacles of climate, elevation above the sea, low prices, distance from markets, and so on; but to those social and class obstacles, which, in so many places, and in so many ways, interfere not only with the rapid extension of our knowledge, but with the diffusion of what we already possess as to the application of science to the rural arts. I may enumerate as belonging to obstacles of this kind:

1st. The aversion to theory, as it is called, which is so generally professed by practical farmers in most countries of the world. Rash and hasty theorising in regard to agriculture, it is right to reject; the error lies in confounding with such theory every thing that does not appear to bear directly upon the more common operations of the farm: as if chemistry, or the chemist, for example, could be of no use to the farmer, because he does not interfere with the handling of the plough, or with the shape and management of the drill machine, or the harrow.

2d. The small amount of talent hitherto in all countries considered necessary to fit a man to become an excellent farmer. This not only lowers the general education and attainments of the agricultural class, and the estimation in which they are held—but it unfits them, as a body, readily to appreciate the labors, or to listen to the counsels of men of science, however prudent and practical they may be.

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3d. The special deficiency, among all grades of the agricultural community, (in England among landlords, among tenants and among laborers,) of any instruction in the elementary parts of those branches of knowledge by which the principles of agriculture are especially illustrated.

4th. The extreme sub-division of the land, which you may not see in this country for many generations, but which already exists as a great evil in some of the countries of Europe. It prevents the use of improved implements, and therefore the encouragement of agricultural mechanics—because the farmer is too poor to buy anything but the merest necessaries. It prevents also the purchase of manures, natural or artificial, to any extent—the employment of paid labor in farming—and generally all those forms of improvement which demand an outlay of capital, or to which the occupation of a considerable breadth of land is a necessary pre-requisite.

5th. An obstacle peculiar to your country, and to its present transition state—and it is really a serious obstacle to improvement—is the feeble local attachment by which the proprietors of the more newly settled districts are bound to their farms. This appears in the fact that so many of your farms are for sale. Few families have yet become so attached to their locations as to be unwilling to sell them, if a fair offer be made. The head of the family trusts to his own skill to do better elsewhere for all his household, with the money for which they may be sold. This state of things will pass away as age creeps over your commonwealths and institutions, but in the meantime it operates as a serious hindrance to the expenditure of money in embellishment or in costly improvements, which might possibly not enhance, in a proportionate degree, the value of these properties in the market.

I merely mention these social obstacles, for although some of them do, as I am informed, exist to a certain extent in this State of New-York, yet I would rather express my high opinion of the much good I have foundamong you, than appear to detract from your just deserts, by discovering and commenting upon wants and defects which in your hurry to get forward, you have as yet scarcely had time to discover, much less to supply or remove.

Encouragements to Agricultural Science in the United States.—Of the good I see, for example, I may specify the enlightened desire exhibited by your several *State governments*, to promote the applications of science to your home agriculture, as it is strikingly shown in the numerous surveys and reports which they have caused to be made and published, in respect to the geology and agricultural capabilities of the sev-

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eral parts of the Union. In this respect your State of New-York occupies a most distinguished position, and its inhabitants will no doubt reap from their well directed exertions, a rich harvest of deserved fruit.

Again—this great Agricultural Fair, the implements and stock here exhibited, the countless numbers who have entered the show yard to see them, and who now surround us—impress upon a foreign visitor, the obvious usefulness and efficient management of your Agricultural Societies, how much they are doing, and how zealously they are supported. To those at a distance, who cannot look upon you with their own eyes, your annual publications speak. I have myself been both interested and instructed by the former volumes of the Transactions of your Society, and I have heard them, in a public meeting in Scotland, most highly spoken of, and favorably contrasted with the published proceedings, even of the Highland and Agricultural Society of Scotland. It gives me pleasure to express my opinion, that the volume for the present year is not only equal to its predecessors, but contains matter highly creditable to the Society, and useful to the advancement of scientific agriculture.

Farther—the interest which, as individuals, you take in the promotion of Agriculture, by the acquisition and application of new knowledge, may be gathered from two circumstances; *first*, from the establishment and liberal endowment of chairs of science in connection with Agriculture, by private parties, in two, at least, of your State universities a liberality at once most patriotic and most judiciously applied; and *second*, from the causes which led to the recent visit to Europe of your countryman, Mr. COLMAN. Him we were led to look upon as a deputy from the individual farmers of this and the adjoining states, to the farmers and agricultural assemblies of Great Britain; for it was your individual encouragement and subscriptions, I believe, and those of your societies, which induced and enabled him to come among us. As your deputy, he was every where received—every where kindly, I believe, as so kind hearted a man deserved to be—and every where with a desire to give him the fullest information on every subject that might be useful to you.

Gentlemen, in the minds of some of your countrymen whom I have met, not so I hope in yours, a wrong impression exists as to the feelings of my countrymen towards you as a community, or as individuals. We do not envy or regret your rapid growth and prosperity as a people—we are proud of it. We do not dislike you individually; we are predisposed, rather, to see good in you and to like you. Whatever sour men on either side of the water may say, you may rest assured that there is a corner in almost every heart at home, which especially warms towards the North American, whether from the colonies or from

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the States, and a warm seat at many a fire side, if he will come and occupy it. It may be old fashioned, gentlemen, but we all still think at home that blood is thicker than water, and if any of you doubt it, we beg you, like Mr. Colman, to come among us, and honestly and frankly to try whether it is so or not.

If I were asked to give a special reason why a knowledge of the scientific principles of Agriculture is more necessary among you than among any other existing people, I would mention the great extent of your territorial dominion, and the varied soils, climates and cultures, which your people encounter, as your dominion over the forest and prairies extends. When you take this fact in connection with another, which is no less familiar to you, that a general set of your population, like a great moving tide, is carrying them towards the south and west; so that the old tillage and crops of one year are often deserted by the mover for a new form of tillage, and the culture of new crops in the next, you will see how useful to the shifting agriculturist himself it must be, and how beneficial to the whole community, that he should possess some degree of familiarity with those principles, not only of geology to which I have already made especial allusion, but of chemistry and botany also, which shall enable him in whatever circumstances of soil, of climate or of tillage he is placed, to make the most of the advantages he happens to possess; to overcome most easily and most economically the difficulties he may have to encounter, and to employ at once his head and hands with skill in bettering his local condition.

As an agricultural people, you possess many advantages over the nations of Europe. You are not old enough to have acquired district and state prejudices, which are difficult to overcome, and which in many parts of Europe, long oppose, successfully, the importation of improvements from abroad.

I may mention, as a most intelligible illustration, the introduction of implements imported from other countries, which in Europe is a very slow process. The swing plough of Scotland, for example, has made its way into many districts of England, has been extensively introduced into some parts of France, Holland, Sweden, and even into Poland and Russia. But into Germany, where attachment to the old tools and methods is so very strong, it makes its way very tardily. And I advert to this instrument—this fundamental instrument, I may call it, of the practical farmer—because I find it mentioned to your credit, by a German writer, that the swing plough has had a much more willing and ready reception among you than among his own countrymen, and that Germany has

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already received many excellent swing ploughs from America.* I have seen plough irons of Scottish manufacture in use in various parts of North America. It is said that plough irons in considerable quantities are now exported from the States in considerable numbers to England.

Whatever is good in other countries, you are very much in a condition to adopt at once. You have, as I have said, fewer old forms to break through, old methods to abandon, old tools to lay aside, and old rules and regulations to abolish. Above all, as proprietors, you work every man for himself and for the profit of his family. Not only are feudal superiorities, servitudes, serfdom and tithes unknown among you, but even rents are not, as with us, to be made up on two dark days of every year. What ought to stand in the way then of your rapid progress in this most important art?

Another great advantage possessed by the agriculturists of this country you will both understand and estimate. As a nation you commence your agricultural career at the point which we have attained. The eminence which we have reached after long climbing you start from. You have the benefit of all our knowledge and experience, and—unwearied with previous labor, or satisfied with the idea, as too many of our farmers are, that you have already done very much—you must progress beyond what we have at present attained to. And with the intellect and energy you inherit you must and will progress. It cannot fail indeed to prove a great blessing to mankind at large, that so many new minds, unfettered by old restraints of prejudice or partial legislation, or conventional custom, are now directed in this country towards the varied arts of social life. Especially must intellectual exertion on your part, in reference to any of the arts of life, benefit us in Great Britain—whom a common parentage, individual ties of blood, and a unity of speech connect, and whom now the broad Atlantic, more than bridged over, almost brings together again into a common home. What you think reacts upon our thoughts; what you speak insensibly affects our speech, and your literature and ours are read and have their influence in both countries. What each discovers sooner becomes property of the other than in the case of nations who speak different tongues; and a step in advance on either side of the Atlantic, carries the arts of the other side along with it. We are not selfish—perhaps I might say we are eminently unselfish—in wishing you to become agricultural improvers. But of all the arts, it may be said more truly of agriculture than of any other, that it is of no country. The producer of the common staff of human life ought in all its perfection, to be the common property of all. In rivaling each

*_Ueber Englische Landwirthschaft von A von Weckherlin._ Stuttgard, 1845, p. 81.

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other in our endeavors to push forward this highest art of life, Britain and America will be striving only which can do most for the human race. And if we in Britain should benefit hereafter by the advances you are destined to make—beyond what you have obtained from us—it will enable us only the more speedily to aid in diffusing a knowledge of these advances among the other nations of the globe.

What is the moral of this discourse, what its immediate application to you whom I have the honor to address ?

Is there improvement any where—let it be seen among you. Is there agricultural progress any where—you ought not to stand still. Are there means of bettering the modes of culture any where—you possess the same. Is there greater knowledge any where—it is within your reach. Is there energy and determination any where—these qualities are inherited in as great strength by you as by any other people. Is the climate favorable any where for special kinds of culture—you possess all climates, and may take a leaf from the farming book of every country. Is knowledge necessary any where—it is so among you; if not because of an over-crowded, yet because of a constantly moving, and at present rather retrograde agricultural population.

And if in consequence of its progressive tendency, the Teuton blood of the Anglo Saxon shade, is destined, as some believe, to conquer and possess this vast continent from sea to sea; it is surely the wish and purpose of the Deity, that such possession should be made a source of happiness both to the ruling and the ruled, and a means of furthering at the same time, that general advancement of the human race which all philanthropists so ardently anticipate.

But this conjoined happiness and progression demand the constant aids of augmenting knowledge. In your western migrations, you must bear with you, to plant on your new soil, the arts and sciences and daily discoveries of the east; and thus will population and civilization extend together to the shores of the wide Pacific.

And among the branches of knowledge which you will most usefully carry with you, those which relate to the arts of rural life, will, above all others, contribute largely to the temporal welfare of your spreading people. That which we know in England, you soon learn to master and apply here; and what is known in the Empire State, ought, in like manner, to diffuse itself hence over the vast dominions of your great confederacy.

Though I have considered it my duty, in conformity with your request, to lay before you the observations I have put together in the present address—it would be presumptuous in me, after what I have

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seen in this show-yard, and in this city, to suppose that any thing I could say, would materially hasten the progress of agriculture among you, or turn you into any better paths than those you have already begun to follow. If any man wishes an evidence of what you are in energy, and what you are capable of in action, let him come to Syracuse, and look around him. It was brought as an accusation against the ancient Romans, that they made a country desolate, and called that peace. It is the nobler praise of the great modern Republic, that you find a country desolate, and cover it with people—a wilderness and you plant it with fertile farms—furnished with rude wigwam encampments, and you strew it over with splendid palaces and great cities. Energy, discernment, constructive talent and administrative skill, must all be united to accomplish such results, so rapidly, so safely, so securely. I thank you for inviting me to come among you, that I might see all this, and might enjoy the gratification which the sight of progress of such a kind imparts. It will be to me a source of future satisfaction, if I shall be able, on reflection, to believe that my visit to your country has in any way contributed to the further or more safe advancement among you of that pursuit, which is the surest support of nations—whether in the Old World or in the New.

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AGRICULTURAL DISCUSSIONS.

Meetings were held on Tuesday and Wednesday evenings during the Fair, at which the subjects of sheep and sheep husbandry, and agricultural schools, were discussed. These meetings excited much interest, and we give a summary of the remarks made at the several meetings. From the experience of the present, as well as the last season, we are satisfied that meetings of this character held during the annual Fair, are productive of great good, and should be continued. There are always in attendance gentlemen of intelligence and practical knowledge, who have an opportunity of exchanging their views, and the farmers in attendance receive instruction of great importance to them, and which they seldom can obtain elsewhere. The Society are under great obligations to the gentlemen who attended and gave interest to these meetings during the Fair; and we would indulge the hope that at our future exhibitions, we shall be permitted to meet them again, and hear from them on matters interesting to the practical farmers of our State.

SHEEP AND SHEEP HUSBANDRY.

Discussion at Market Hall, Syracuse, on Tuesday evening, Sept. 11.

The Hon. Wm. Fuller, of the county of Onondaga, who had been selected to preside over the discussion, called to order. He announced the subject for the evening's discussion to be, "*Sheep and Sheep Husbandry*," stating that Mr. Howard, who was to have opened it, was unavoidably detained. But he saw around him many who were familiarly and widely known as extensive growers and manufacturers of wool, and who were fully capable to give their views and the result of their experience in relation thereto. He called on Mr. Scovel, of Salisbury, Conn., to open the discussion.

Mr. Scovel said that this was the first meeting of the kind he had ever attended in this State, and being so, he preferred to be rather more initiated before he took so prominent a part in the proceedings.

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Mr. BLANCHARD said that as most if not all of those present were interested in the growth of sheep, and the discussion of that subject being the object of the meeting, he would suggest that those who had peculiar notions in relation to it should now set them forth for the advantage of all concerned. That there were preferences existing among persons in regard to different breeds of sheep, he was aware. He saw here many whom he recognised as wool-growers, who had endeavored to make all the experiments suggested by experience and their own knowledge, and who have been very successful in the improvement of their flocks, and the quality and quantity of their wool. It was this we desired to discuss here. Here was his friend, Mr. Curtis, of Columbia, before him, who had been twenty years a breeder of sheep, had tried different grades, and had arrived at a satisfactory conclusion in his own mind, that one particular grade was better than another.

Mr. CURTIS, of Columbia county, said that he had been a wool-grower for twenty years. About fifteen years ago, he commenced to cross the Saxony on the Merino breed, and had continued that course ever since. His flock was composed entirely of ewes, and yielded him an average of from three and one-quarter to three and one-half pounds to the fleece. So far as his individual interests were concerned, he had found it best for him to pursue that course, though after all he was satisfied that if a man applied himself to one steady course of breeding, it was, perhaps, not so much matter what it was, so long as he profited by it. It was this eternal changing and shifting, which ruined almost every man who attempted it. They would find, at a particular time one particular kind of wool most in demand, and would go into that; and when the demand had failed, then would lay it aside, and go into something else. The true course was the pursuit of one regular, steady system. Such at least was the result of his experience. The form and fleece of the sheep could be changed, though it was not an easy matter, and one requiring a great deal of attention to ensure success. He had been crossing the Escurial Merino with fine Saxony bucks, and the result was they were brought very nearly to Saxony sheep. As he before said, his flock were all ewes and lambs, and his attention was confined solely to the raising of wool.

Mr. BLANCHARD inquired if it were better calculated to improve the quality of the sheep, by crossing with a fine buck on a lower grade, or by the reverse course. He gave as the result of his observation, that it was most judicious to cross a fine buck on a lower grade, than to pursue a contrary course; but he would like to have the views of others on the subject.

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Mr. CURTIS was satisfied that it was best to use fine bucks on coarse ewes. He had tried both plans, and this was the result of his experience. His plan was to get the heaviest Saxony bucks he could find. As for what was called the improved plain Merino, they would not do for him; he would not give a dollar a piece for all that could be offered him.

Mr. SANFORD, of Orwell, Vt., had done something in sheep growing, and thought that where the right kind of sheep were bred, it was a very nice business. There were a great many points on which he did not fully agree with the gentleman last up. He thought the true course was a medium one—not breeding grades either too coarse or too fine, but observing some regard to the different locations and sections in which they were bred. To be a successful breeder, he believed one must first look at the constitution, then at the quality, and then at the quantity of the wool; and that it was all these, combined and united, which alone could ensure a man success. To unite these successfully, all must see, was indeed a very nice business. For himself, he commenced the business first with Merino sheep, in 1828, procured from Mr. Jewett's flock. He bred them for several years, crossing them with nothing else, for he had never found any better breed than that of Mr. Jewett. After several years his sheep degenerated, growing feeble, &c., when he made a cross from Mr. Atwell's, of Connecticut, flock of Merino sheep. He (Mr. S.) bred Merino sheep wholly, and he had improved them very much, in this way, in their constitution, and the quality and quantity of their fleeces. His flock generally yielded over four pounds to the fleece—never less than that. Without disparaging Saxony sheep, he thought the Merino grades better for Vermont growers. Profit he supposed to be the object of every breeder; and he had certainly found the Merino the most profitable for him. One of his neighbors was breeding Saxony sheep, and he did not think he made as much money as those did who used the Merino.

Mr. CURTIS: Yet your Vermont men make money out of the Saxony.

Mr. SANFORD formed his opinion from the facts. His desire was to grow the kind which would produce the most money according to the acre of ground. There were locations, perhaps, further South, where Saxony sheep would be most profitable; but in Vermont a hardier kind of sheep was required. He thought a medium Merino to be the best, and he would run into no extremes. A few years ago, many ran into too coarse a grade of wool. His own flock was of the medium description, varying from 300 to 500 sheep.

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Mr. REED, of Ohio, said that he paid as much attention to the size and form of a sheep, as to the quality of the wool. Like begat like; and this was a point to be as much regarded as any other in sheep breeding.

Mr. SCOVEL, of Salisbury, Conn, said this seemed to be a sort of meeting in which each one told his experience, and he would now therefore, add his own, so far as he had been engaged in wool growing. He commenced the business in 1824, on the first importation of Saxony sheep. Part of his flock at that time was not full blooded, and he did not get it entirely pure until some ten years since; now it was composed of entirely pure full blooded Saxony sheep. Gentlemen were prejudiced in favor of their own mode of growing, and perhaps he participated in the same feeling, but he would state what was his system. Raising his flock as he had stated, his wool had averaged in weight, by the flock, (he never sheared anything but ewes and ewe lambs,) from two to two pounds six or seven ounces. His bucks he sold. From 1830 to 1837, he sold his wool at a dollar a pound, and from that time to the present, for from 70 to 80 cents. The growing of Saxony sheep required more attention than the Merino. It was necessary, in his opinion, that all sheep should be housed, whatever might be their grade, but Saxony sheep particularly. Of this last description there were a great many grades, and he did not wonder that many wool growers had become out of patience with growing some kinds of grades. The feeble constitutioned Saxony sheep he would not advise any one to go into. His flock were the thick close wooled sheep, of short legged, compact, handsome form, and in these particulars he was satisfied there was not a flock in the country that would compare with them. Their present excellence was only attained by the closest attention. Four years ago he crossed with some of the best sheep in the country, keeping them in different flocks and separate families.

At the same time he imported nine Saxony bucks from Germany, and his family had been greatly improved by that cross, and were much larger than his old stock. He thought the pure Saxony to be of much larger bodies than any Merino he had ever seen, and of stronger constitution. Some of his bucks last year sheared in the dirt without washing, and which of course is no criterion to judge, from 12 to 16 pounds. After washing the yield was from 5½ to 6 pounds. He would not advise people to go into Saxony wools unless it was "fancy Saxony." He would advise them to go into no breeds of sheep that would come into competition with the grades of wool of this country. For years he had been in the habit of buying wool largely in western New-York,

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and his wool averaged as much as theirs, which most of it was a cross of Saxony and native sheep. He had always been enabled to sell his stock sheep and surplus at a large price, and that probably had given him more encouragement than had he been in receipt merely of the value of the wool, though he believed if he had not sold them, his wool would have brought him more by the flock than any he had ever seen. As for Merino wool, he had bought a great deal of it, and thought it better for the grower than for the manufacturer. He found that when it was cleansed and got ready for the card, there was not much more left of it than of a fleece of a Saxony sheep in the same order.

Mr. FULLER: Did you ever take a hundred pounds or any amount of each and compare them after cleansing.

Mr. SCOVEL: Yes, sir. He (Mr. S.) had never known any Merino wool which cleansed away less than sixty per cent. That was always considered a pretty fair average. This was very well for the farmer, but for the manufacturer who bought it, it would be but a few years before he would be unable to buy wool of any description. It was a pretty good lot of wool that would not cleanse away more than 33½ per cent., and that was about the grade of western New-York. His Saxony cleansed away some 15 or 20 per cent.

Mr. BLANCHARD: Do you mean to convey the idea that the fleece, washed in the ordinary manner in the stream, cleanses away 60 per cent?

Mr. SCOVEL said that the Merino wool, even that which looked white and clean, if rubbed a little between the fingers, it would most always be the case that oil in drops would be yielded from it. He knew not why it was so, but such at all events was his observation. So far as his experience was concerned, the wool of western New-York was too much of a mixture—a class neither one thing nor another. Wool that sold this year at 30 to 32 cents would not weigh more than from one to two pounds eight or ten ounces to the fleece, yielding but a small income, when higher grades would have done better. So far as keeping sheep was concerned, he had sometimes bought sheep of other grades and kept them in flocks by themselves, for the purpose of experiment, and the result was that he believed he could keep three Saxony sheep at the same expense as two Merinos. He thought there was certainly that amount of difference in the same amount of feed. And take a flock of sheep like our native sheep, and they would not live six months in the same flock with the Saxony sheep, feeding them the same. He kept from 1,500 to 2,000 sheep, and he never found any equal to the Saxony. He found it necessary to house his sheep in winter, and he believed that

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many farmers lost a great amount of wool and sheep by letting them run about exposed. From the first hard storms in November, he put them up, and did not let them go out again until grass came. His sheds were furnished with running water in winter as well as summer. The wool therefore was kept perfectly dry and not subject to rot and other deficiencies incident to exposure to the wet, and a quarter less hay also was required to keep them. His neighbors at first prophecied that his sheep would become diseased and die from being thus housed; but, instead of that, they grew well and thrifty, and, so far from being diseased, were perfectly healthy during the winter. Now his neighbors coincided with him in the opinion that the only true course was to shut them up. He put them in buildings 35 feet square, in flocks of 150. He had them fitted up with racks and mangers, so as to feed them with whatever he felt disposed, with salt if required. This plan he would recommend to every farmer, whatever might be his breed of sheep. There were some farmers whose sheep were dying in the spring, with, as some supposed, grub in the head or some other place. There was great difficulty also with others who, being exposed all winter, had got the snuffles and the consumption. Now all sheep had the worm in the head, but, kept up as they ought to be, they will turn out ten or fifteen per cent. better than those exposed to storm and weather. Anybody who has bought and dealt in wool can tell a fleece from a sheep which has been housed, in a moment. The ends of the fleeces exposed to the wintry weather do not look like wool but like felt; and when put in the mill, being dead, work off, and are an entire loss to the manufacturer. His lambs grew better in winter than in summer. He never lost more than one or two sheep in winter; his losses were in the summer, and then generally only by accident.

Mr. REED: How do you keep your sheep from dying in the winter?

Mr. SCOVEL had but one way, and that was to keep them under tight sheds, with the hay overhead, large boxes, perfectly tight, with racks spread through the shed, with rounds and mangers. The hay was taken and spread through the racks three times a-day. Sheep on a hot sultry day will not eat half so much as they will on a cool day, with a keen, cutting north wind. On such a day they want double the usual feed to keep them up. There were some who fed them just as much on a warm, sultry day as on a cold day, and the consequence was, the feed would be trodden under foot, and destroyed. A comparison of averages, as to the cost of breeding and feeding on his plan and that of some of his neighbors, showed a large per centage in his favor. His friend there, Mr. CURTIS, he knew, bred Saxony bucks on Merinos, and consequently got a pretty safe kind of wool; but there were few men

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who could manage grade sheep as well as he did. But he would repeat, he believed that the fleeces of the Saxony bucks from Germany would average as much as that of any Merino sheep put in the same condition, cleansed and ready for the card. He had an hospital, a place 30 feet long by 12 feet wide, and on each side stalls done off with racks and mangers, where he put any of his flock that were sick or feeble. To these he would give a little grain. Here was another difficulty with many farmers; when they had a sheep run down, or a little sick, they put them up and feed them with grain so strong as to set them a scouring, and they would not live 24 hours. They should take them up early and feed them sparingly with grain. He kept different ages and flocks by themselves, feeding them with grain every day. He used stalls for bucks during the fall of the year, and fed them as much as they want.

M. BLANCHARD: Do you have any reference, in the construction of your racks, as to whether the hay seed gets into their necks or not.

Mr. SCOVEL said he did, and that that was a most important matter. Sheep kept so as to allow the hay seed to get upon them, had their necks spoiled, filled up and matted, so that it becomes almost cloth in the spring of the year. He took a three or four inch scantling and put rounds in two feet long and three inches apart, and on the bottom of the scantling, he nailed a board 20 or 24 inches wide, and this being so put up, that the sheep can just get in their noses, any hay seed therefore goes into the manger, where the sheep would eat every thing close up. It was handy, also, if it was desired to give them salt. His sheep eat from two to three and a half pounds of feed per day.

Mr. BLANCHARD, of Kinderhook, remarked that there were wool growers in different sections who were growing Merino sheep, and he believed they were on the right road. They were successful in business, and were contributing their full share towards the supply of wool in the country. Again, there were a class of wool growers who grew Saxony sheep, and he thought they also were on the right road. Their skill in breeding, location and success, were abundant proof that they were making their flocks profitable, and they also supplied the demand for that kind of wool. Now, if the impression goes abroad, that Merino sheep, in cleansing, shrinks 60 per cent., and Saxony only 25 or 28 per cent., it would be making 30 per cent. difference on the value of the same quantity of wool. His observation led him to join issue on this point. In order to test this question, about four years since he sold an Eastern manufacturer several parcels of wool. Some were pure blooded Saxony, one of the best flock in the country; some were grade

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sheep, and one fleece in particular might be termed a Merino fleece. The fleeces were heavy and in good condition. From 11 of them he made selections, and asked the manufacturer to give him the result of his operations in regard thereto. The Saxony fleece shrunk 33 per cent.; the heaviest of the 11 fleeces shrunk 47, if he recollected right; at any rate, there was just 14 per cent. difference. In making a comparison of shrinking qualities, due regard should be had to the various classes of wool. He believed it to be universally conceded by manufacturers, that the higher the grade of sheep the more animal oil was there; and therefore, in calculating the shrinking, the average of the fleece should be taken.

Mr. HOWARD wished to add a few remarks in reference to the grub in the head of sheep. He had examined the heads of many sheep, and in all of them had found the presence of worms, and the result was he had never seen anything to induce the belief that sheep died of grub in the head. Several years ago there was a great mortality among sheep in Vermont, New-Hampshire and Maine, which was ascribed to grub in the head. He made a very extensive examination, and in almost every instance it was evident that they died of the liver rot. He believed grub in the head could not produce death. He had found the worm in all its stages, even to the chrysalis, in the heads of healthy sheep. As to the best kinds of sheep, that depended on the location and management. It was better, he believed, to have more than one kind. A proper way to decide the question would be a course of regular experiments, by which the cost of keeping of each of the various kinds of sheep could be tested and compared. It had been said that you could keep two sheep weighing 200 lbs. as cheap as one sheep of the same weight. But was this opinion justified by a comparison with man, swine, or any other animals in regard to which experiments had been made? Col. Sherwood had been engaged in feeding cattle for years, and his experience was, that it was no guide at all. He had sometimes found that one who would not gain a pound a day, would eat as much as one who gained four pounds a day. It seemed to him, a proper criterion in regard to this matter would be the amount of profit realized from a given extent of land divided into two parts, with a different kind of sheep on each, and then each parcel being charged with its own expenses, a comparison of the two would show which realized the most profits. This continued through a series of years with a succession of similar results, would establish a state of facts, than which nothing could be more desired by wool growers. Again it was evident from our growing population, which had to be fed, that mutton is becoming an impor-

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tant staple, and this coupled with the fact that different kinds of wool were required, would make the raising of mutton as profitable and perhaps more so, than any other business. He knew of some individuals engaged in the business, who had made handsome profits. The wool either of Southdown or common sheep, was worth from 25 to 28 cents, and weighed generally from 3 to 3 1-2 pounds per fleece. Long wools were required for various kinds of worsted and carpets, and the wool of this variety of sheep was worth from 25 to 28 cents, and their fleeces averaged 5 to 6 pounds. He had known the flock of one farmer which averaged 7 pounds. It was a question to be determined whether the English varieties of sheep should be raised for mutton, or whether it was not better to breed a kind of sheep for our own purposes. There was a kind raised in Canada, something like the English Leicestershire, which were highly prized by the Boston butchers. As to the difference between Saxon and Merino sheep—he understood the Saxony to be originally the Spanish Merino changed by cultivation and it was a question therefore, where we should begin to draw the difference, whether in a sheep a year removed, or ten years or how many.

Mr. Scovel inquired, whether in rearing English sheep for mutton, it would not be necessary to keep them in separate stalls, like fat cattle, and also whether a flock of 1,000 could live on a farm, let it be ever so rich.

Mr. Howard had never known more than 300 or 400 kept by any man in this country. He did not think they need be herded together in large numbers; but all knew that it was the boast of the Duke of Buccleugh, that he kept 15,000 sheep; and many English farmers kept large flocks of from 2 to 3,000.

Mr. Scovel thought himself, that sheep did not often die with grub in the head. From his observation, they were always to be found in the head of sheep in the winter season. Sheep were often known to snort like a horse, and it was then that they often threw off the grub. When by exposure or anything else, the sheep became so enfeebled as to be unable to throw off these grubs, their death was frequently the result.

Mr. Reed asked Mr. Blanchard to describe what was considered a good sample of wool.

Mr. Blanchard would rather show than describe such a thing. He hardly knew how to begin. It was called a good specimen of wool, when the fibres had a uniform, regular length. There were two kinds of fine wool—one the natural result of pure blood, and the other of disease or unnatural growth. It was rather difficult to describe with-

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out having a sample before him. Where the sheep had been exposed to the wet, the fibres were uneven, and weak in the center, so that when wound up, [here Mr. B., with a piece of wool, described what he meant,] it would not make a thread of uniform thickness. To be good, it should be uniform in its thickness from one end to another. Mr. B. then referred to the patent report, as furnishing other particulars on this head.

Mr. REED asked if, when sheep were sheared early, and turned into the storm, it did not injure the wool.

Mr. BLANCHARD thought it was from the fact that when sheep are exposed to the water, the ends of the wool are injured. He was told that it was so regarded where they grow the best wools; the sheep are never suffered to go into the water from year to year. They are not turned into the grass even till the dew is off.

Mr. SCOVEL said that sheep were injured, too, by starting their feed too soon after feeding is commenced.

Mr. REED asked to have the top of a good specimen of wool described.

Mr. BLANCHARD said that it should be square and even, of the same thickness at the ends as in the middle; not smooth, like a plane board, but standing in clusters, which he called staples.

And then the meeting adjourned.

MEETING ON THE SUBJECT OF AN AGRICULTURAL SCHOOL.

A conversational meeting, for the discussion of the above subject, was held at the 1st Presbyterian church, Tuesday evening, Sept. 11th.

Mr. DELAFIELD, of Seneca county, on taking the chair, after having stated the object of the meeting, proceeded to remark that if he was not mistaken, about seven-eights of the population of this State were agriculturists, and hence the necessity of such an Institution as the one proposed. The subject had already attracted the attention of the Legislature of this State, and a movement had been made in reference to this important matter. He had often asked himself the question, how it was that the practical farmers had paid so little regard to this subject? It struck him that they, of all others, needed education—an elementary education in the various branches of knowledge. The farmer needed a knowledge of law to enable him to act in a judicial capacity; a knowledge of medicine in order to encounter the diseases to which he is subjected while far away from the places where medical skill can be obtained. In short, he needed a general knowledge of the

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various branches of science. He hoped if there were lawyers in the house, they would not be offended when he said that the farmers could settle their disputes without their aid, and there was no actual necessity for their services. Farmers were too content to let their children receive only the common rudiments of education; they needed something more; they needed a direct knowledge of the matters with which they had to deal. Our schools and colleges instructed their sons in the more abtruse departments of education, but unfortunately led away their minds from the cultivation of the earth, and hence were of little use to the farmer's son. The farmer's son needed such an education as would enable him to cultivate the earth intelligently—to know what he does and why he does it—to know from facts derived from research, that what he does is right and not because his father or his neighbor did so before him.

Hon. Sam'l Cheever, of Saratoga, apologized by saying that his friends had taken the liberty of posting him up as one who was to open the discussion in the absence of Mr. Blunt, of N. Y., and this was the first notice he had of the part he was expected to take. Having given the subject some consideration he would submit such views as seemed to him important. He proceeded to remark that education upon any subject presupposed the want of it. He found that this subject of an Agricultural School met with more opposition from farmers than from any other class. Professional and educated men readily yielded assent to it. But, says the farmer, "what do we want to know about your chemistry and your geology, in order to raise our corn and potatoes? We know it all now." The fact was, the farmer needed education in his profession just as much as the lawyer and the physician, who were obliged to spend years of time to qualify them for success in their pursuits. The farmer had a mistaken notion that his was a subordinate pursuit. Was it so? What progress would the merchant, the manufacturer and the mechanic make with as little knowledge of their respective occupations, as the farmer has ordinarily of his? Such a question might startle those who can raise such good crops; but might not the fact of their raising fine crops be perchance because they had hit upon the course which science indicated? What did they know of the nature of the soils they cultivated? What could they tell of the composition of clay, sand or muck?

Science has already done much and is still doing more to shed light upon our path. It has taught us the elements constituting a fertile soil and those of a barren one. It has taught us the elements found in all the fertilizing agents or manures, within our reach, whether of mineral,

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vegetable or animal formation. Hence we are shown what admixtures of soil to make to supply with one the deficiencies of the other. It has taught us what manures to apply to sterility to produce fertility. It has taught us the elements constituting the plants of our agricultural crops. Hence we may determine what crop we may expect most successfully to place upon any given soil, and what manures are best suited to its growth.

Science has also taught us the elements constituting the different parts of our domestic animals, from which useful suggestions are obtained for feeding them according to the end to be attained. For instance it is found that our Indian corn contains elements calculated to fatten the animal, but not those that strengthen the muscles so much as those found in our oats. The one, therefore, should be fed for one purpose and the other for another. This principle has been tested in practice through the agency of the State Agricultural Society. A pair of oxen of about equal weight and equal vigor, were put at hard work, and one fed upon corn and the other upon oats, of equal weight, daily, for two or three months, and each with a full supply of hay. It was found that the one fed on oats soon got the mastery at the draft over his mate, and maintained it so long as he was so fed. The feed was then reversed for the same length of time. The corn-fed ox when put upon oats immediately recovered his power, and obtained the mastery over his late superior, and maintained it to the end. Science and experiment have here established a fact of vast importance to the farmers of this state in feeding their laboring animals. Still, with hundreds of such experiments and such results before us, there are too many of our own class among us who are daily telling us that our agricultural books and our agricultural papers are not worth reading, and that agricultural science is a "*humbug*." To such I can only say, if you do not cast about you and do not read, you are in great danger of being left behind.

True it is, books alone, without practical application, would be slow to make a good farmer. The professor of mathematics, directly from the schools, with all his books, would doubtless make a sorry figure in navigating the ship in a storm, and might receive useful lessons from the less educated shipmate. But when the science of the mathematician is added to the practice of the sailor the accomplished navigator is produced.

The practical farmer, so boastingly calling himself, may, if he has fallen upon a fertile spot, succeed for years and get tolerable crops, by following in the old track, without the lights of science, and probably for

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the reason that he has accidentally hit upon the course which science would indicate. But in a large portion of the long cultivated parts of our country, the fertility of the soil has been exhausted by those hereditary systems, if systems they may be called, and nothing but science and intelligence will produce restoration.

If the man without reading, and without books, on finding his crops failing under a long and exhausting course, can be induced at all to seek improvement through experiment, he is as likely to make the wrong application as the right. He has seen his neighbor restore a field by the application of lime, and concludes his fields have the same disease and must be cured by the same remedy. He lays out his money to make the experiment and fails. Another neighbor has succeeded with plaster, and his money is again spent upon that, without success, and so he goes on exhausting the catalogue of manures, and exhausting his purse, until he gives up in despair, sells out to a *reading* farmer and goes to Wisconsin or Texas, where he can begin again his exhausting process upon a new and fertile spot. His reading successor examines his worn out soil, or has it done for a few shillings, and finds it entirely exhausted and destitute of the essential element of *potash*. He applies a few bushels of ashes instead of lime, in which latter the soil already abounds, and his crops are soon doubled. Instances similar to this are occurring daily around us. I place myself with the rest when I say that no class of men in this country know so little of the business they follow, as do our farmers.

The lawyer spends one third of a life at books to fit himself to enter his profession, and then studies by day and night for the rest of his life to understand his business and do his duty. The divine is found spending all the days of an entire life at his books, to maintain his standing and discharge his duties. The physician also enters his profession only through a long course of severe study, and then all his life while a "*practical physician*," spends every spare moment at his books, to see what the skill and the experiments of others are doing. The commercial man and the manufacturer spend their time at their business, and their talents in studying the course of trade and the state of the markets. The artizan of every craft, after years of apprenticeship, spends his days at his work and his nights at his books, to learn and perfect himself in the mysteries of his art and to understand the price current of his wares.

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But the farmer is thought to be *born* with all the knowledge necessary for his calling, and that learning and science are matters for other folks to trouble themselves about; when in fact how little do we know even of good *practical* farming, to say nothing of *scientific*. What do most of us know of the component parts of the soil we cultivate, in what they are deficient, and the cheapest and best means to supply such deficiencies; and what do we know of the elements in the manures we are constantly using. Still we go on blindfold, applying and mixing the one with the other, sometimes with good effect, sometimes with bad, and sometimes with no effect at all. What should we think of the man who should enter the laboratory of the chemist, and proceed to throw together his alkalies, his acids and his metals, without any knowledge of their properties or of their affinities, and then tell us he expected certain results. We should expect to see him burn his fingers, at least if he did not get blown up, and yet the admixture of soil, the application of manures, and the cultivation of our crops, is a constant but enlarged chemical process.

But to be more practical. How few of us can tell with any approximation to certainty, the difference in effect, in the first and the succeeding crops, of applying manures, in mixing them with the surface, or turning them under the furrow? What portion of us understand the principles of draining and of irrigation, and the expense of each compared with the benefits? Again, what, as a class, do we know of correct systems of breeding and improving farm stock? of the anatomy and physiology of our animals? of their diseases and their proper treatment? Enlightened *practical* agriculture, aided by the lights of science, is daily solving and settling many of these questions which are of much importance to us, but questions which, in our confidence that we know all, have never even occurred to many of us. But thanks to the spirit of the times, the dark days of our agriculture are passing away, and light is breaking upon it so clear "that *he that runs may read*," and he that does not read will be run away from.

Nothing, however, has yet been done in this State, to furnish the means for a good agricultural education. The State Society has repeatedly addressed the Legislature upon this subject, but with little effect until last winter. The Governor, in his message to the last Legislature, feeling the importance and the necessity for an institution for instruction in that branch of knowledge, aware also that the public voice was loudly calling for it, asked their attention to the subject, suggesting the propriety of a

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suitable appropriation for the establishment of an Agricultural School connected with a farm for practical husbandry. The result has been, the appointment, by the Governor, under the direction of the Legislature, of eight commissioners, one from each judicial district, to mature and report a plan for such a school connected with a farm, with plans for buildings and the probable expense That commission will report a plan to the Governor, which he will communicate to the next Legislature. Strong expectations are entertained that the project will find favor with the law making power, that an appropriation will be made and the institution be commenced.

It has been stated that the farmers, on their produce sent to market, and on the merchandize they consume, pay more than three-fourths of all the canal tolls. These tolls, for the half of a single month, would furnish more than enough to cover the whole expense of such an institution and a fund to maintain it. It only remains for the farmers themselves and friends of Agriculture in the State, to be true to themselves, and the work will be accomplished. Such an institution should be competent to accommodate, in the beginning, at least 250 pupils. The expense should be put so low as to open it to the sons of almost every farmer or other persons who should desire to share in its benefits. This can to some extent be effected by the partial labor of the pupil as a part of his education. He may there be taught practical and scientific farming. He will be taught to distinguish the different kinds of soil, the component parts of each, the adaptation of every crop to its appropriate soil, the best time and the best mode of preparing the ground for the crop, the best and cheapest mode of cultivating, maturing and securing it. He will be taught the value, and the best means of procuring or furnishing, and the best mode of applying manures, under any supposable circumstances; the best and cheapest mode of fencing; the best and cheapest mode of draining and of irrigation. Again, he will be taught what most of us might be usefully taught, *general farm management*, by which the whole work of the season can be best done and at the least expense. He will be taught farm accounts. He will receive instruction in all the varieties of farm stock; how to distinguish the different breeds, and grades, and the best modes of breeding and feeding. Especially will he be taught, as far as may be, to distinguish the different qualities of the horse, his good and bad points, and his adaptation to particular service, the diseases to which he and other animals are subject, the symptoms of each disease and the best mode of treatment.

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He will be taught gardening, the planting, grafting, budding and pruning of fruit trees in all their varieties. All this is "*practical farming.*" And do not our sons and we ourselves want instruction in it? The pupils there will receive instruction in mathematics and land surveying, in mechanics and its principles, in mineralogy, in geology, in agricultural chemistry and botany, in history and belles-letters. In fine, if he has capacity, he will receive an education which will fit him for the successful cultivation and management of his farm, to hold a conspicuous place in the social circle, to fill the local offices in his town and county, and to appear with credit to himself and his constituency upon the floors of our state and national Legislatures. When our farmers are thus educated, as I trust they will soon *begin* to be, farming will no longer be a business of guess work, nor of degradation, nor will the farmer be held in a subordinate position, go where he may.

With owners thus educated, how soon would most of our farms put on a new dress. Our swamps and bogs, most of them store houses of valuable manure, would be unlocked, and their treasures made available as fertilizing agents. Our marshes and unseemly quagmires would be drained and made productive; our motly herds and flocks would give place to beauty, symmetry, thrift and profit; and the aggregate value of the agricultural property of the State would be enhanced to an amount which it would not now be safe to mention.

To the man thus educated, the farm would be a scene of attraction and entertainment. As a naturalist, he would find in the animals about him, and the insects in his path, objects constantly drawing his attention, and inviting his study. As a geologist, he would find in every rock, every boulder and every rod of ground, matter for examination and classification. As a chemist, from the admixture of soils, the application of the variously compounded manures; in the germination of seeds and the vegetation of plants, he would find his fields an enlarged but unerring laboratory, where the principles of his science are as obviously and with as much fidelity elaborated as over the retort and crucible in the lecture room.

As a pursuit, farming induces an equanimity of temper and a spirit of contentment more than any other. Riots and outbreaks are unknown among farmers. On the contrary, sobriety, morality, and orderly observance of the laws of society and the laws of the land are everywhere to be seen. Even now, without the education which their class demands, they are the happiest of our men and the best of our citizens.

True, wealth is not so rapidly acquired upon the farm as sometimes elsewhere. The commercial man, often, by a turn in the market makes

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more money in a few days than the farmer does in years. So, too, does the commercial man, by an adverse turn in the market, or by a single sea storm, loose, in a single day the avails of a long life of toil and solicitude. The gains of a farmer are less, so are his hazards; and it may be added, the gains of the farmer are small, and so are his wants.

A man with a capital too small to embark in commercial pursuits can, with a well-managed farm, place himself in a state of independence and of mental quiet, hardly to be found even amongst the most opulent of those engaged in the more adventurous pursuits of life. A farmer, though paying more taxes and bearing more of the public burthens than any others of his means, he does these without complaint. He enjoys the good market and submits to the bad with equanimity. Neither drought nor flood disheartens him. His stores will supply his present wants, and he looks forward to the returning season to bring him relief. His voice is not heard at the door of our State or national Legislature, asking special laws for his benefit, or for the protection of his interests. If the nation taxes him lightly in the shape of duties, he is gratified; if heavily, he submits and pays. He does not discharge his men or stop his plow because his taxes are high and his markets low. The press does not groan nor is the public ear dinned with his complaints. Whoever may throw up his business and discharge his laborers because his profits do not suit him, the farmer is found at his post as sure as seed-time and harvest return. These are the men that should find favor with the public, and to their voice should our law makers give ear.

The farmers of this State have fair promise in prospect. The increase of demand for our crops is more than the increase of production. The growth of our manufacturing, and more especially of our commercial towns, is furnishing an increasing demand for our surplus. The city of New-York alone, with its environs, have this day a population of about half a million, all consumers of our produce, and none producers. But we are hereafter to look with confidence beyond this for a market. A more liberal, a more humane, and I think a more enlightened policy is finding favor with the statesmen of Great Britain. Her restrictive policy is giving way, and with it her corn laws are relaxed, by which our grains, our provisions and our dairies are admitted into her markets on more favorable terms. Large shipments of these are going forward and at remunerating prices. Where we five years ago sent hundreds to these markets, we now send by thousands and tens of thousands.

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Statistics show that we can send breadstuffs to England at a profit and undersell the producers upon the continent. The farmers of western New-York can send their flour to Liverpool and realize a profit of about two dollars per barrel over cost of production and charges, and then successfully compete with the Russian and German grower. The Indian corn of the valley of the Hudson is now finding its way there at good prices, with no fear of European competition. We need not fear, therefore, to improve our cultivation and increase our crops, lest we overstock the market and bring down prices.

Prof. NORTON, of Yale College, being called upon, said, that for two or three years he had been engaged in giving instruction in scientific agriculture, and he had found the great obstacle in the way of improvement in farming, arises from the fact that the farmers thought they knew much as was necessary. In the State of Connecticut, three-fourths of the legislators were farmers; yet it was with the greatest difficulty that a small appropriation could be procured for the diffusion of this branch of knowledge. The fallacy of the argument that farmers knew enough was shown by the deterioration of farms in many parts of the country. As to any plans proposed, he was not prepared, nor did he think it proper for him to recommend any particular one, only he was strongly in favor of the general subject of education among farmers.

Mr. BUCKLAND, of Canada, being invited to give his views, said, he concurred in the views which had been presented in relation to the connection of science with agriculture; but thought that the tendency of the high scientific attainments was to create a distaste for manual labor. What was wanted in his opinion, was a sufficient encouragement to really scientific men to induce them to give their time and services to the subject. An education in the science of agriculture might be given in the common schools and higher institutions of learning, sufficient for all practical purposes.

The CHAIRMAN submitted a few remarks stating what progress had been made in the district where he resided, mainly through the influence of a small society that was formed some years ago. One man, who at first derided the idea of science being applied to agriculture, at last came to one of the members for information on a particular subject and generously tendered the individual $3.

Mr. ALLEN, of Buffalo, followed with some remarks, and offered the following resolution:

Resolved, That this meeting recommend to the next Legislature to pass a law making an appropriation for an Agricultural School.

Mr. EVANS, of Madison county, desired to say a word or two for the purpose of showing that a knowledge of agricultural science did not

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tend to create a distaste for manual labor in farming, but on the contrary, he had found upon introducing this branch of study into the institution with which he was connected, that the pupils became more and more anxious as they pursued their studies to follow the occupation of farming.

The meeting was further addressed by Messrs. CHEEVER, BUCKLAND and others, and then adjourned to meet on the following evening at the same place.

Wednesday Evening, September 12th.

The meeting was called to order by Mr. DELAFIELD, the chairman of the last meeting. He remarked that when they assembled last evening the subject of agricultural education attracted their attention until a very late hour. It was joyous to every friend of agriculture to find the deep interest manifested on that occasion. Since then he had ascertained one or two facts, interesting to all, that he would mention before the discussion was entered upon, much in the same plain and desultory manner that he addressed them last evening, with the object of presenting thoughts and views, rather to provoke public attention than with any idea of giving information. In one of our sister States, the excellent and thrifty State of Maryland, the necessity of agricultural education had already excited the public attention. An appropriation was made at the last session of the Legislature for the establishment of a professorship of agriculture; and it had been substantially and well filled, to the great advantage of the farmer, and he need not add, because it was so of necessity, to the very great advantage of the state. He had not had an opportunity of referring to the act under which that professorship was appointed, but if he understood it, the plan was one from which the farmer would derive very great advantage indeed, and the State abundant honor as well as compensation. He did not by throwing out this fact mean to say that it was the course for us to take, but he thought that agricultural education was the point to which they should turn their most devoted attention. Those who were too far advanced in life to derive much benefit therefrom, would secure it to their sons and children now coming forward, who stand greatly in need of such instruction. And when the youth of the country should have been thus imbued with an elementary knowledge of agricultural education, professorships would undoubtedly grow up abundantly as the demand should seek supply. They had before and among them that evening men of science from different parts of the world, who could readily, and far better than he, point out the better course to be adopted for meeting the objects in view. He trusted they would be induced to give some practical obser-

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vations upon our proposition. He said *our* proposition—and it was one that he esteemed far, very far beyond any other—and he would be permitted to say that he thought he had had an opportunity of seeing, knowing, and being long conversant with other professions in life, and though at a somewhat late period he entered practically upon the profession of the farmer, he could now judge with considerable accuracy, perhaps, of its value as compared with other professions.

He would not detain them farther, as he saw before him Professor Mapes, a gentleman thoroughly connected with all the subjects he had touched upon, and who was well able to instruct them in relation thereto. He was very sure that five minutes could be occupied by that gentleman that would bring to them matter for hours, aye days of consideration, the results of which might last them for years to come.

Professor MAPES remarked, that he felt his position to be extremely awkward, both from the fact that many of the audience were well known to have a knowledge on all subjects connected with agricultural education superior to that he possessed, and from the high eulogium passed upon him by the president. He felt, however, the importance to the nation at large, of their acting as pioneers in the advancement of agricultural education, and that therefore it was a great privilege to be heard on the occasion. Perhaps it might be well before entering upon the subject proposed for the evening's discussion to make some remarks on the improvements in agriculture of more recent date; and he should do so, not as a chemist, but as a farmer practically engaged in the business.

In the first place with a view to understand that we wish to bring about, and what sort of education this must be, we can in a very few words refer to the theory of vegetation sufficiently to see what advantage we seek to derive from it. We know that vegetables are composed of a variety of substances, and for our present purposes, it was only necessary for us to refer to those existing in the largest quantities. Thus we know that turnips are principally composed of water, and we know also that on removing the water from any vegetable the great majority of the mass left is carbon. If we place in an iron vessel sufficiently closed at the bottom, and open at the top, an amount of vegetable matter, and place the first end over a fire we get rid of the water by evaporation, and in a little while we find we have the charcoal for a majority of the weight of the vegetable. Now without entering further on this point let us look how this charcoal gets there.

We know that the atmosphere contains oxygen gas, and we know that if we burn charcoal with that, the coal dissolves and forms a color-

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less gas. If we take this new gas or carbonic acid, and treat it in a particular manner, we re-produce carbon. We know also that 25-100ths of the ammonia is composed of this carbonic acid gas. Many crops, such as clover may for twenty years be taken from the land, without subtracting from it a particle in weight. And the clover will be even found to be improved. The question then arises whence comes this clover? It must be either from the soil, or the atmosphere, for the growing plant touches nothing else. The atmosphere we know, contains the amount of ammonia necessary for the growth of the plant. Thus for instance after a shower, we find the gardens growing with new vigor, but if we draw water from a well and throw on the plants, it will not produce the same effect. It was the rain that drew the ammonia from the atmosphere, and carried it to the root of the plant, and the proof was, that if we draw water from a cistern, and dissolve in it a small piece of ammonia, then it would have the same effect as rain water, and we can perceive no perceptible difference. This was the practical effect, and he did not doubt that many had tried it. Another question arises, by what property in the soil are these materials received? Laying aside all chemical effects connected with it, and looking at the physical effects only, we know that the soil has the power to absorb many materials with peculiar tenacity, and to retain them until absorbed by the growing plant. We know for instance that charcoal dust receives ammonia, and will retain it, even with a very considerable degree of heat, until the root of the plant is brought in contact with it, when it will separate the charcoal from the ammonia. Now we suppose the soil to have this property itself to a very considerable extent, and believe it due to the carbonaceous matter contained therein. We find that whenever we mix with the soil articles that it readily decomposes, it is capable of receiving a large amount of ammonia from the atmosphere and does do so.

The Professor here illustrated his point by the description of an experiment by which in a cistern, water would percolate through the ground, so as to absorb the ammonia, and leave no taste behind. It was (he said) from this fact alone that the ammonia in your wells is absorbed before the rain reaches it, that enables you to drink it. We know that a fishy duck buried under the soil for one night loses its fishy flavor, and if cooked the next day resembles tame duck. Now all the other materials composing plants are of equal importance to their growth no doubt, but not to the extent in many as compared to those spoken of. The supply of carbon is constant, and is furnished by its very consumption. Every stick of wood burned, and indeed all the crop of '48 that has been consumed in any manner be-

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comes carbonic acid gas for the creation of the crop of 1849, while all the animal matter destroyed in 1848 supplies ammonia for 1849. No other matter performed that duty, and thus we were permitted to play with these new materials as with a toy, presenting them to you one year in the form of a cabbage and another as a tree. They go back and exist again, and from the common course of nature again take the variety of shapes they first assumed. We cannot consume it at all, but merely make use of it for a time, and back it goes again to carry out nature's law. Every integrant of a plant is just as important as this carbon. Farmers who do not take the trouble to read will be found manuring most indiscreetly.

Where he lived, where phosphate of lime was needed, farmers would be using manure with it, and not receiving any benefit therefrom. They would ask if such or such an article was good for manure, and receiving an affirmative answer, put it in without reference to the fact whether it contained the constituents necessary for the soil. Manures, we find by experience, are all absorbed within 34 inches of the surface of the soil; and it was a general supposition that the roots of plants do not penetrate the earth to a greater depth. He made an experiment two years since, that might be curious to some present. He planted a hill of corn on a knoll, and when ripe, he attached the top of the stalk to a pole, and washed away the earth with water, through a brass nozzle pipe, till he laid the roots bare, without abrasing them, washing away a large amount of soil. He found the roots to average about five feet —very few less than that—in depth. Now, it would be percieved that if the soil was dug to a great depth it naturally followed that these roots would have a better opportunity of penetrating to that depth. The quantity of carbonic acid gas passing through the roots to the atmosphere must be in proportion to the disintegration and the ammonia received. If, when the dews fall, the ground is dug to a great depth, it can pass into the soil, and will not be carried away by the morning sun; but if it be confined to five or six inches of soil, the sun carries away the ammonia before the requirements of the plant make use of it, and so large an amount was not retained. For the retention of moisture deep disintegration was required. If a pitcher be filled with ice, and the outside be wiped perfectly dry, in a few moments it would be profusely covered with drops of water. We know that it is condensed from the atmosphere, and that it does not pass through the pitcher. If we take a globe of glass in the hottest day of summer in the open field, and then fill it with the atmosphere surrounding it, and seal it up and place it there surrounded with ice, in a few moments the outside would

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be found covered with water. This proves that this water is existing in the atmosphere from which it is thus condensed—and the greater the surface, the more water is condensed. If land be disintegrated to a considerable depth, the consequence would be that the condensation of moisture from the atmosphere would be in proportion. Therefore, in soils well disintegrated, we find that vegetables do not suffer from drought, as they do where such is not the case. This fact has undoubtedly given rise to sub-soil plowing, and the most extensive benefits are arising from its use. He delivered a course of lectures last winter in Somerset county, New-Jersey, where they had been in the habit of plowing to the depth of some four or five inches only. This year more than one hundred sub-soil plows are in use there, and they now plow ten or fifteen inches deeper. They first plow with the surface plows, and then run the sub-soil plows on the bottom of the furrows; and a number of gentlemen had called on him and he had not found a dissenting voice as to the usefulness of the improvement.

There were some facts in relation to under-draining. By under-drains, we, in the first place, get clear of the water in the soil, and therefore get the chemical action of the atmosphere which takes its place. This is not all. We derive other benefits from under-drains, besides getting rid of water and the admission of atmosphere in its place, to the upper soil. Last year he opened the upper end of an under-drain, and consequently a current of air obtained a circulation through it. He planted a crop across it, and the effect was immediate improvement in the crops, and the reason was that the quantity of atmosphere circulated in the drain supplied the roots of the plants with the necessary amount of carbonic acid gas, &c. Not only that, but there was a continual change in the atmosphere under the drain, and therefore the new amounts of moisture condensing furnished an immediate supply of ammonia. We know also that if we manure oats ever so lightly, they will sometimes lodge. This is not from the lack of ammonia, but of the soil which it stands in need of. The Professor described the composition of silex as a basis of flint, and common sand, not soluble in itself, but perpetly so if combined with potash. Therefore, a farmer would find the benefit of the use of the spent lye of soapboiling, or potash, or spent ashes, for either contained it in large amounts.

He was sorry his time would not permit him to go elaborately into this matter, and with more arrangement, and would close this part of the subject by referring to instances of success, where agricultural knowledge was carried to great perfection. Look at Harsimus, in New-Jersey, opposite New-York, where market gardeners were to be found

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paying $50, and even $100 per acre, rent, and making money at that. So, for land near Philadelphia, $70 per acre, rent, were paid for agricultural purposes, and large profits realized. We find in one part of the country, corn raised at the rate of 150 shelled bushels to the acre. We know that this is tremendously above the average, and that there are but few instances of this kind. But we know it to be true, and further, that this very land, in some instances, had been pronounced unfit for the cultivation of corn. It was by the proper application of agricultural science that these things had been brought about. It is but a few years ago, and within the recollection of some of our old members, that the iron plow-share was introduced, or brought into general use, and we now plow seven times as much land, with less labor, in the same length of time as before.

We see the immense benefits these improvements realize to our country, and still we had no school or arrangement by which we could foster even mechanical knowledge on the part of the agriculturist. He is not even supposed to be able to direct the mechanic how to make his own implements. One of the most important results to be brought about by the improvement of agriculture, was the rendering it fashionable. Laugh at the word as we may—until it did become so, the young men could not be induced to apply themselves to it as readily as to other professions, or even be induced to believe that the sciences connected with it are worthy of attention. We all knew that the farmers generally, at the north, have played second fiddle to the merchants about them; and gentlemen at the south, anxious to become farmers, to get rid of the obnoxious word, called themselves planters, and there was found in the southern country a supposed distinction between planters and farmers. Education alone could change this state of things. As to its importance as a pursuit, it was only necessary to observe the fact that the farmers paid nine-tenths of the taxes directly or indirectly, and do not receive one-tenth of the benefits of the disbursement of this tax. At this time it does happen, however, that we need a portion of this one-tenth, and it becomes necessary that we should not only understand the importance of Agricultural education, but the right to demand it, and to call on the Legislature to furnish it.

In Germany no citizen can hold a public office unless he has received the honors of a university, and therefore every farmer was anxious to educate his son for the station. But unfortunately, the fashion there exists that an educated man cannot labor, and consequently we find the world overrun and annoyed with poor German scholars. Now let us look where labor is rendered fashionable, and see the difference. Com-

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mon schools have existed in Scotland from an early date. When you are looking for gardeners, you get Scotchmen, because you find them highly educated. Labor was rendered fashionable at home, and was part of their primary education. Go to the alms-house, and you will find poor German scholars in plenty, but find a Scotch farmer there if you can. The fact of their education closes forever the doors of all public charities to them.

Look at our own country. New-England commenced her common school system early, and though not applied to Agriculture directly, it prepared the community for labor. Go now to what part of the country you will, and you find the sons of New-England prosperous and industrious, and labor among them considered honorable. This was not the case in some States that he might mention.

France seems to see the necessity of Agricultural Education, for even now, with a perplexed government, we find her establishing Agricultural schools throughout her departments. She had now established over one hundred, and the youth of the most superior class were entering them to study the Agricultural and adjunct sciences. What will be the consequences? In a few years, these men will be sent broad-cast over the land, disseminating the feeling that the most highly educated part of community is engaged in Agriculture. This caused the rates of tuition to be so high, that the wealthy only are able to participate in it, and the general diffusion of these benefits prevented. A number of those who were formerly noblemen, and they were not the less so from their present course, were acting as professors in these institutions. France is aware that increase of production is increase of wealth, and is acting in reference to that idea. She followed out the same system in regard to another manufacture—the art of design. They were introduced as part of school education a hundred years ago, and during Napoleon's time were most liberally fostered. What has been the consequences? All your candelabras, fancy silver ware, rich carpets, tin ware, &c., were patterned in France, and she has laid the world under contribution for beautiful designs and patterns. You see your wives and daughters wearing the beautiful French fabrics at four shillings a yard, and in two weeks afer, your New England manufacturers furnish the same patterns for 12½ cents. The fashion soon disappears, and the Frenchman makes the 40 per cent and the New England man but two per cent.

We are told by the lawyer and the politician, that we are the bone and sinew of the land, and they give us compliments in plenty; we are not short of them at all. We understand all the poetry of agriculture

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and its attractions, accompanied by warts on the hand; [Laughter.] and perhaps these may be lessened if we have the advantage of a system by which we may collect information. Look at the benefits that a well organized department of Agriculture would bring to the State. Would not such an institution collect the facts existing relative to land and its culture in various parts of the State, and digest and collate them properly for general information? Could not the farmers then induce their more apt sons to become farmers? Now the smarter ones look after professions, while some brother who did not appear quite so bright was selected to stay at home and become a farmer, and in nine cases out of ten, to support his other brothers, who had enjoyed all the blessings of that education in which he should have participated.

We need an Agricultural Institution, also, to do away with a great number of hypotheses now existing, or of reducing them to practice, and to so clear an understanding, as to meet the comprehension of all. The immense concourse attending this Fair, was an evidence that the whole State was alive to the importance of Agriculture. What we needed now was a common school to collect and make known information. Now, if one made a discovery, he published it perhaps in an Agricultural paper, and for want of confidence on the part of the Agriculturists in the journal, or in the practical abilities of the editor, who, although he can write a handsome, showy article, may know nothing about farming, it passes by unnoticed, and is lost to the public. But if it had been communicated to an Agricultural school, it would have undergone a close investigation, and if found worthy, been put forth for the use of the farmer in such a manner as to ensure their confidence. It would do away, too, with the deep-rooted prejudice against book-farming, so called. He was not surprised at the existence of this prejudice, when he looked at the immense quantity of scientific nonsense that had been published by those who knew nothing of practical Agriculture.

There was one other subject he desired to refer to, not so directly connected with the subject of a school, but most intimately with Agricultural interests. This is the only country in the world where turnpikes were allowed to charge toll on any fertilizing material passing over it. In England, and every where, except here, the toll on all these fertilizing articles is small, while here, there is no distinction made, even on our public works. We find in a part of the State, men buying refuse salt at a high price, and using it six bushels to the acre. Suppose the refuse salt from the works here was passed on the canals at so

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low a rate of tolls, that farmers would be tempted to use it, it would not be long before there would be such an increased demand, as to give a larger revenue than is now realized. Manures in England, of any kind, were always charged on railroads, as well as turnpikes, lower tolls than any other commodities. Seeds and grafts, also, should be allowed to be sent through the mails at the same charge as newspapers. By these means, all that was valuable could be generally diffused throughout the country. Now, there was a great difficulty in respect to this, and many a valuable graft or seed we would hear of in another part of the country could not be obtained for want of an easy channel of communication.

As to the Agricultural school, it was the most important step before the Society since its organization. In the first place, it is a duty we owe to the rising generation, that our children should be educated better than ourselves; that their profession may not deteriorate, or fall behind any other. We cannot correct the world; these prejudices against it to which he had referred, do exist, and laugh at them as we will, we know that they do. It was within our power to do away with them by securing the establishment of this school. And with an exhortation to renewed and active exertion to this end, Professor M. concluded his address, greeted with loud and prolonged applause.

Mr. Allen, of Buffalo, said that the resolution offered by him yesterday evening, was in fact the main question they were called upon to discuss. For several years the Agricultural Society has discussed the subject of an Agricultural college, and farmers pressed its attention upon the Legislature. The farmers, it is was well understood, paid nine-tenths of the taxes, and the other professions get nine-tenths of the benefits; so that the Agricultural interest was the pack horse for the commercial and speculative interests of community. Every one knew it sustained the great draft, not only of means, but of members, to supply other classes. The young men who left their farm homes to go into other professions, never, or very rarely, came back again. Some of them we hear from again, if they become rich, but most of those who come back, do so with their health impaired, poor, and to become a tax on others. All this was a tax which the farmers should not be subjected to without receiving some benefit in return, which they do not. It was well understood that they were far behind the other professions in improvement, and himself a farmer, he hoped no one would feel aggrieved at the declaration.

The other professions had their academies and colleges, and other advantages of means in acquiring knowledge; and what had the farmer?

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Nothing. All could understand from the remarks of Prof. Mapes, that Agriculture was a science, and one susceptible of continued improvement and advancement. All know that throughout the State, there were farms of inferior soil, yielding far heavier crops, than richer soils, and how was it done? Simply by understanding manures, and their effects on the soil. Look at western New-York: once they could raise thirty or forty bushels of wheat to the acre, in repeated succession; but could they do so now? No! fifteen bushels, was as much as was generally raised. This could only be restored by a thorough agricultural education, and the application of its results to the soil. This could only be obtained through an Agricultural school.

It is proposed that the Legislature should make an appropriation for this purpose, and he hoped farmers enough would be sent there, to secure its being done, for they could control the Legislature of the State if they chose. It would be no hardship for the State thus to expend some $10, or $20,000, out of the millions they receive from the farmers, in canal tolls, on the produce they sent to market. There was no mistake about it—the farmers were, he repeated, the pack-horse for the whole community. The lawyer who draws a writ, may settle right, but to all eternity, he will not produce a turnip. And so with the merchant, he lives on his profits, and not on his produce. Therefore, the State could well afford to pay $15, $20, or even $100.000, if necessary, for the benefit of the experiment. Four, five, or six hundred acres could be bought in a central part of the State, where it could be easily reached, and comprising as far as possible, all the varieties of land; a little bottom land for instance, with good old-fashioned bogs on it, some stone to make stone wall, with swamps to be drained, forest land, and some old cultivated land, which the student could learn how to make better. Then there should be on it, the necessary dwelling house, barns, sheep-sheds, and other buildings. And at the head of all this, should be placed a plain, common-sense man, thoroughly versed in agricultural science, practical, as well as theoretical, and able to explain it, in terms that all could understand. He would place there, one or two children from each county, there to be educated in all the branches of agricultural education, and required to reduce its results to daily practice, in every department of farming. Boys learned faster than it was supposed they did, and they would readily take pleasure in learning all these things. In this way, Agriculture would come to be an exalted profession, and you would soon find the farmer instead of on a rainy day, adjourning to the tavern, to talk politics, resorting to his books; and thus would they become elevated and respectable, and enjoy all the advantages of any other profession. These last, had their societies and

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Lyceums in the towns, all of which tended to mutual improvement; but take a collection of farmers on a canal boat, or in a railroad car, and what would be their topic of conversation? Why purely politics, or something else that was equally foreign to their profession, instead of crops, or the importance of the soil. What was wanted was, that their profession should be made of equal importance to the others, and therefore, the Legislature should endow a school or college for them, in the same manner as it had endowed similar institutions for the other professions. He hoped then, that the resolutions concurring, in the recommendation of Gov. Fish, would pass and the experiment be fairly tried. [Applause.]

Mr. Heffron, of Oneida, thought this was a subject, demanding much investigation, ere it was finally passed upon. Was it the best plan for the Legislature to vest all the encouragement it would give to the farming interest, at one central point? Could they have all their various soils in this State, tested with such a plan? Would this not be a difficult matter to reach, and would it not be better for the State to extend its benefits to the different farming counties, in different portions of the State? It seemed to him that it would; and at as cheap a cost, while the great interests they had to subserve, would be better encouraged. Look at the course of this State in regard to the education of teachers for common schools. In the first place, a few years ago, an appropriation was made to the academies of each Senatorial district, for that purpose. It worked well; but still the community were not satisfied, and the State Normal School was established. Suppose the farmers now apply to the Legislature for an appropriation for each of the eight judicial districts, and attach to four or five academies, in different sections of the State, a small farm. Then let a professorship of agriculture be established in each of them, so that the student could learn that science, in addition to the others taught. Then every variety of soil, and the manures and productions best adapted to each, thoroughly tested, which it appeared to him, could not be the case with a single farm or school, in one section of the State. This was his preference, but he was anxious to have something done, and should yield to what should be the determination of the meeting.

Dr. Lee, of Georgia, (formerly of Buffalo,) said it was well known, that he had taken a deep interest in the subject of an Agricultural school. Attempts were made to establish such an institution, as early as 1822, and during the whole of that period, in which a generation has passed off the stage, the subject had received the closest attention of the friends of Agriculture, in the Empire State. The great difficulty

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has been, that they were divided on the subject. Some desired one school, some three, and some eight, and some, one in every county, and in this way, they had accomplished nothing. He would counsel them to be united, and they would be successful. A bill making an appropriation of $15,000 for this purpose, which he presented in the Legislature, received 100 out of 108 votes in the lower house. In 1844, the next year, it again passed the house, but was lost in the Senate, by one vote; it receiving 21, and 22 votes being necessary for the appropriation. Now, agreeably to the recommendation of Gov. Fish, the Legislature has appointed a committee of eight, one from each judicial district, who after a careful investigation for months, have come to a general conclusion, and are prepared to report, through the Governor, to the Legislature, on the subject. They recommended, and as he thought, wisely, the establishment of a single school and farm, to test the experiment. If it was to be a successful one, the Legislature would establish as many more, as the farmers should demand. As regarded a single professor, they might as well have a single professor in a medical college, and require him to teach all the branches of the healing art, as to expect one man to teach every branch of Agriculture. At least six professors were required. These were the views he had adopted, after years of reflection and careful investigation. You must have in this State, a pattern institution, which will be adopted in every State. And it will be, because the Empire State is looked to in that light. He appeared here from Georgia, and he would tell them, they were acting not for themselves alone, but for the 4,000,000 of farmers in the Union, looking to this State, and its Agriculture, for a worthy example. Set it to them. He hoped, therefore, the resolutions would be adopted.

The CHAIRMAN invited Professor HIGGINS, Agricultural chemist, of Maryland, to give to the meeting the benefit of his experience as to what was doing in the cause of Agriculture there.

Professor HIGGINS, in response to this invitation, desired to correct the impression that in the South Agriculture was looked upon as disrespectful, and that in order to get rid of the obnoxious word farmer, that of planter was used. It was an error, and he wished to correct it. The difference of terms arose, not from any sense of degradation attached to either, but because they were applied to different occupations. A farmer was the same as the like class here, while the term planter was applied to those who largely cultivated tobacco, cotton, and corn. This was the only difference; and the farmer held the same position there as he did all over the country. In his own State, Maryland, some

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of the most distinguished men were engaged in the profession. As regarded his experience in his own State, he would briefly give them its results. Many lands had become utterly worn out; but some of them, by the proper application of manures, had been rendered fertile again. This led to the inquiry how it was done; and the Legislature was solicited, for several years, to diffuse a knowledge of the different soils throughout the State. A law was passed, creating a Professorship of Agriculture, whose duty it should be to examine the different soils, and give lectures in every section of the State for the benefit of all. Thus every one would become instructed as to the composition of his soil, and the manures best adapted for it. An agricultural school would be a great benefit; but while knowledge was being acquired there, the present generation was suffering from the want of it. This want it was the duty of the State to supply, through lectures or publications. The profession of Agriculture, to be successfully prosecuted, required as much learning as any other; and much as scientific research and examination had developed, there was still much left undone. It was well said that New-York was looked to as the leader—as the pioneer in this great work, and that it was her duty to set an example which her sister States would be glad to follow. (Applause.)

Professor MAPES explained that he intended to be understood, in his reference to the terms planter and farmer, to say, that the invidious distinction between the two was made in the Northern, and not in the Southern States.

Mr. DELAFIELD, (the Chairman,) said that the distinction between planter and farmer had given rise to one explanation, and he would add another. He could tell an anecdote, which he thought was about the bottom of this whole matter. In one of our large cities there were some amateur farmers, who got together to discuss agriculture and the sciences connected therewith; and the result of some part of their discussion, he thought, would fully explain all this difficulty. The question was asked, and seriously discussed, whether any gentleman present could tell the age of a cow by her upper teeth. (Laughter.) He apprehended that was the solution of many of those difficulties to be found in our large cities, where this misunderstanding occurs.

The question was then taken on Mr. Allen's resolutions, and they were adopted.

The meeting then adjourned.

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New-York State Agricultural Society.

REPORTS OF COMMITTEES, 1849.

CATTLE.

Class I. SHORT HORNS. *77 Entries.*

Judges.—Charles B. Calvert, Riversdale, Maryland; Henry Parsons, Guelph, C. W.; E. P. Prentice, Mount Hope.

The first premium, of $25, for best aged bull, is awarded to J. M. Sherwood, Auburn, for his imported bull, "3d Duke of Cambridge;"* the second premium, of $15, to Thomas Bell, Morrissania, for his bull, "Damon;" and the third premium to S. P. Chapman, Clockville, for his bull, "Buena Vista."

The first premium, of $20, for the best two year old bull, is awarded to Wm. Fuller, Skaneateles, for his two year old bull, ——; the second premium, of $10, to A. G. Percy, Arcadia; and the third premium, of $5, to J. B. Burnet, Syracuse.

The first premium, of $15, for the best one year old bull, is awarded to Lewis G. Morris, Fordham, for his bull, "Lamartine;" the second premium, of $10, to S. P. Chapman, Clockville, for his bull, "Fortune."

The first premium, of $10, for the best bull calf, is awarded to Lewis G. Morris, Fordham, for his bull calf, "Logan;" the second premium, of Transactions and $3, to J. M. Sherwood, Auburn, for his bull calf, "Lactometer."

The first premium, of $25, for the best aged cow, is awarded to S. P. Chapman, Clockville, for his cow, "Charlotte;" the second, of $15, to Lewis G. Morris, Fordham, for his cow, "Pottawattamie;" the third, of $5, to John M. Sherwood, Auburn, for his cow, "Lilly."

The first premium, of $20, for best two year old heifer, is awarded to Francis Rotch, Butternuts, for his heifer, "Artless;" the second premium, of $10, to Lewis F. Allen, Black Rock, for his white heifer; the third, of $5, to J. M. Sherwood, Auburn, for his heifer, "Phantom."

* *Pedigree.*—3d Duke of Cambridge was got by Duke of Northumberland, (1940;) dam, Waterloo 2d, by Belvidere; grandam, Waterloo 1st, by Waterloo, (2816;) great grand dam, Lady Antrim by Waterloo; Anna by Lawnsleeves, (365;) Angelina by Phenomenon, (491;) Duke of Northumberland, bred by the late Thomas Bates, got by Belvidere, (1706;) dam, Duchess 34th, by Belvidere, (1706;) grand dam, Duchess 29th by second Hubback, (1423.)

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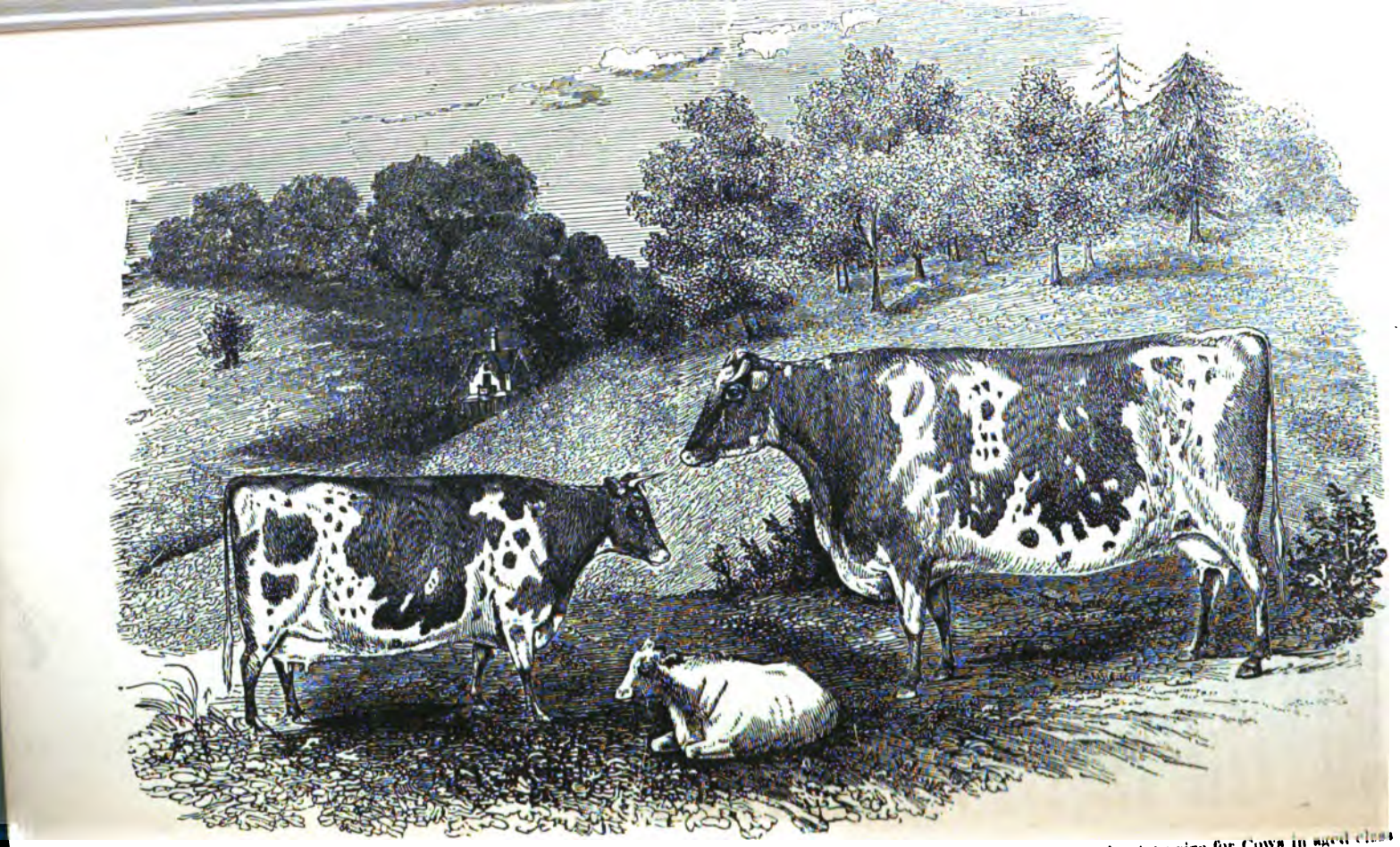

CHARLOTTE. Bred by E. P. Prentice, Mount Hope. The property of S. P. Chapman, Clockville of Short Horns, at Syracuse, 1849. **AYRSHIRE COW, AYR.** The property of E. P. Prentice, Mount Hope. Winner of the 1st prize for Cows in aged class

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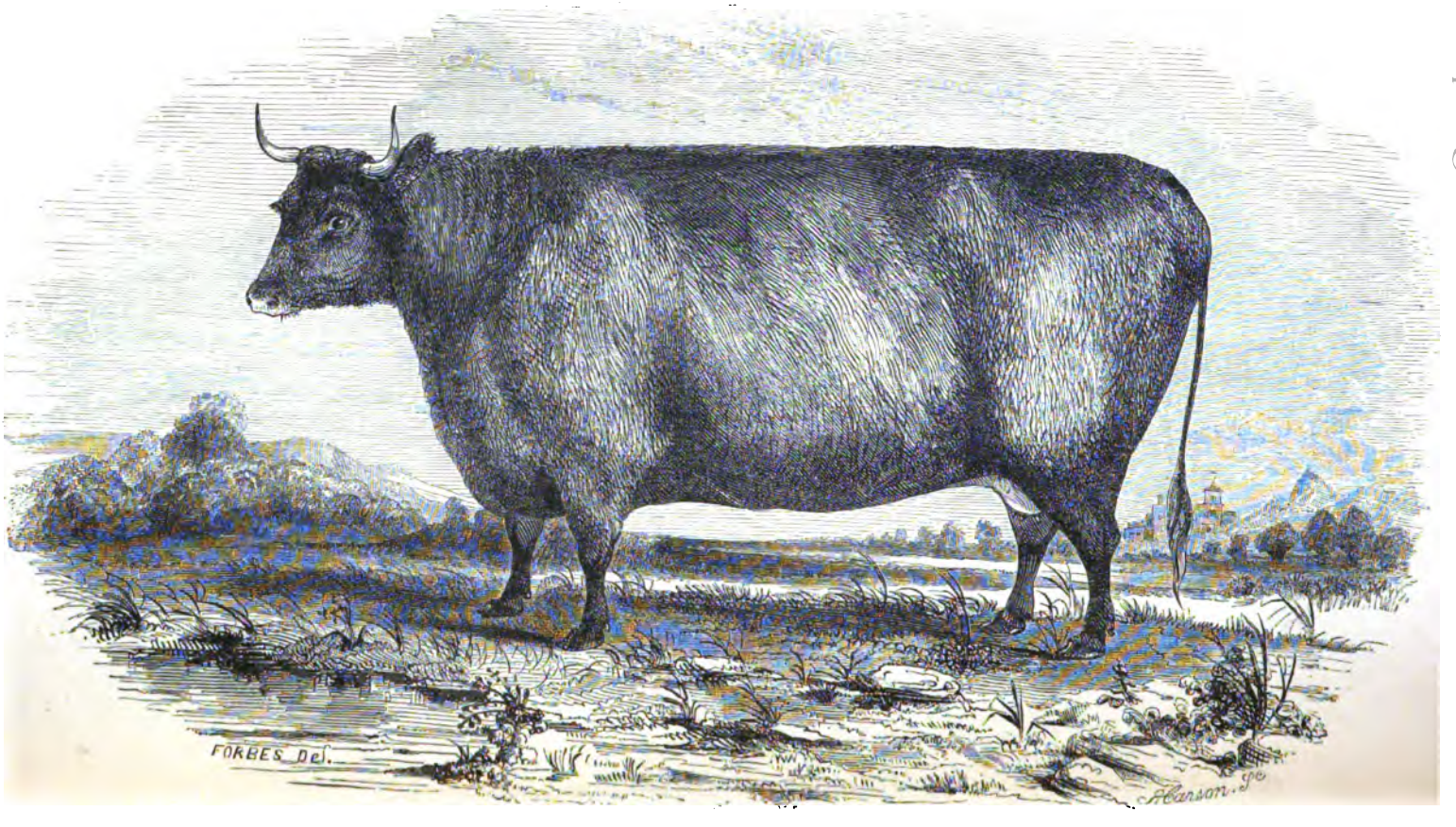

DEVON COW.

The property of A. Stevens. Winner of the 1st Prize in Devon Class, at Syracuse 1840.—p. 85.

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The first premium, of $15, for the best one year old heifer, is awarded to Ambrose Stevens, New-York, for his heifer, "Princess 2d;" the second, of $10, to J. M. Sherwood, Auburn, for his heifer, "Red Rose;" the third, of $5, to S. P. Chapman, Clockville, for his heifer, "Fashion."

The first premium, of $10, for the best heifer calf, is awarded to Lewis F. Allen, Black Rock; the second, of Transactions and $3, to J. M. Sherwood, Auburn, for his heifer calf, "Peona."

Class II. Devons. 87 *Entries.*

Judges.—Richard C. Gapper, Thornhill, C. W.; L. T. Marshall, Vernon; Israel Boies, Homer.

The first premium, of $25, for best aged bull, is awarded to R. H. Van Rensselaer, Butternuts, for his Devon bull, "Bishop;" the second, of $15, to R. M. Remington, Sennett, for his bull, "Young Eclipse;" the third, of $5, to J. Blakeslee, North Salem, Westchester co., for his bull, "Matchless."

The first premium, of $20, for best two year old bull, is awarded to David S. Earl, Salina; the second, of $10, to H. N. Washbon, Butternuts.

The first premium, of $15, for best one year old bull, to H. N. Washbon, Butternuts; the second, of $10, to David C. Howe, Brutus, for his bull, "Rocket."

The first premium, of $10, for the best bull calf, is awarded to E. P. Beck, Sheldon, Wyoming co.; the second, of Transactions and $3, to H. N. Washbon, Butternuts.

The first premium, of $25, for best and aged cow, is awarded to Ambrose Stevens, New-York; the second, of $15, to H. N. Washbon, Butternuts; the third, of $5, to E. P. Beck, Sheldon.

The first premium, of $20, for the best two year old heifer, is awarded to Lewis F. Allen, Black Rock; the second, of $10, and the third, of $5, to E. P. Beck, Sheldon.

The first premium, of $15, for the best one year old heifer, is awarded to H. N. Washbon, Butternuts; the second, of $10, to E. P. Beck, of Sheldon; the third, of $5, to R. H. Van Rensselaer, Butternuts.

The first premium, of $10, for the best heifer calf, is awarded to H. N. Washbon, Butternuts; the second, of Transactions and $3, to Ambrose Stevens, New-York.

The judges on Devon cattle, report: that they were much gratified, to see such a large number, and so many excellent specimens of this valuable class of animals, and feel that much credit is due to those gentlemen, who have been at the trouble and expense of introducing, and breeding these beautiful animals. The judges feel assured, that this breed of animals, will prove the most useful and beneficial to the country, generally.

Class 3. Herefords. 14 *Entries.*

Judges.—I. S. Hitchcock, Oneida Castle, Edward S. Massey, Watertown.

The first premium of $20, for best two year old bull, is awarded to Allen Ayrault, Geneseo, for his bull "Tromp." The second of $10, to W. H. Sotham, Black Rock, for his bull "Champion." The first pre

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mium of $10, for the best bull calf, is awarded to W. H. Sotham, Black rock, for his bull calf "Wantage." The second Trans. and $3, to Allen Ayrault, Geneseo, for his bull calf "Balromel." The first premium of $25, awarded for best aged cow, awarded to W. H. Sotham, Black Rock, for his cow "Lilly." The second of $15, to Allen Ayrault, Geneseo, for his cow "Short tail." The third of $5, to L. F. Allen, Black Rock, for his cow "Rarity."

The first premium of $20, for best two years old heifer, awarded to to Wm. H. Sotham, Black Rock, for his heifer "Coquette." The second of $10, to Allen Ayrault, Geneseo, for his heifer "Flirt." The second premium of $10, for second best one year old heifer, to W. H. Sotham, Black Rock, for his heifer "Jenny Lind." The third of $5, to L. F. Allen, Black Rock, for his heifer "Countess, No. 3." The first premium of $10, for best heifer calf, is awarded to L. F. Allen, Black Rock, for his heifer calf "Syracuse." The second, Trans. and $3, to W. H. Sotham, Black Rock, for his heifer calf "Countess, No. 6."

Class 4. AYRSHIRES. 15 *Entries.*

The first premium of $25, for best aged bull, awarded to E. P. Prentice, Mount Hope, for his bull "Dandy." The second of $15, to L. G. Morris, Fordham, for his bull "Ayrshire."

The first premium of $10, for best bull calf, awarded E. P. Prentice, Mount Hope, for his bull calf "Dundee." The first premium of $25, for best aged cow, awarded E. P. Prentice, Mount Hope, for his cow "Mida." The second, $15, Robert Rone, Mount Morris.

The first premium $20, for best two years old heifer, awarded E. P. Prentice, Mount Hope, for his heifer "Mida 2d."

The first premium $15, for best one year old heifer, awarded E. P. Prentice, Mount Hope, for his heifer "Jenny 2d." The second $10, Robert Rone, Mount Morris. The third $5, L. G. Morris, for his heifer "Jenny Deans."

The first premium, $10, for best heifer calf, awarded E. P. Prentice, Mount Hope.

NATIVE AND GRADE CATTLE. 67 *Entries.*

Judges.—Lewis Juliand, Greene; Lathrop Brockway, Kirkland; P. Richmond, Herkimer.

The first premium, $20, for the best aged cow, awarded to David S. Earle, Salina, for his Durham and native cow. The second, $12, S. P. Chapman, Clockville, for his Durham and native cow "Beauty." The third, $4, L. G. Morris, Fordham, for his grade cow "Lady Bronx."

The first premium, $15, for best two years old heifer, awarded to Chauncey C. Cook, Kirkland, for his grade heifer, Durham and native. The second, $10, David S. Earl, Salina, for his grade heifer. The third, $3, L. S. Bundy, Otego, for his grade heifer, Devon and native. The first premium of $10, for best one year old heifer, awarded E. Sheldon, Sennett, for his grade heifer. The second, $8, B. Williams, Pompey. The third, $3, B. M. Remington, Sennett, for his grade heifer, Devon and native.

The first premium, $3, for best heifer calf, awarded C. Merriman, Cazenovia, for his grade calf. The second, Trans., S. C. Parker, Van

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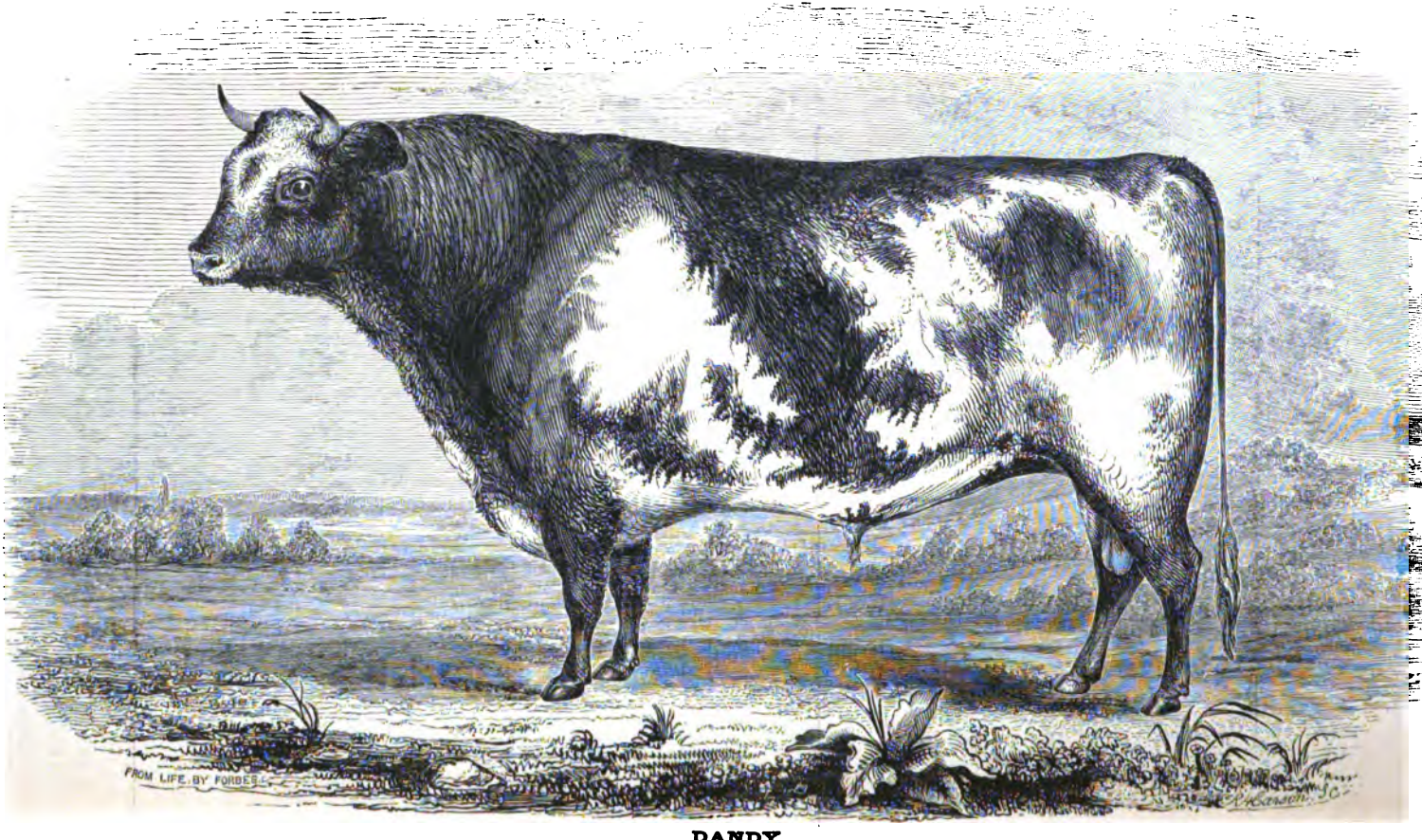

DANDY.

The property of E. P. Prentice, Mount Hope. Winner of the 1st Prize for Aged Bulls, in Ayrshire Class, at Syracuse, 1870.—p. 87.

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Buren, for his grade calf. Mr. Parker has 7 other grade calves, highly commended; and for ten 3 years old heifers, a discretionary premium of vol. Transactions, is awarded Mr. Parker.

Working Oxen. 34 *Yoke.*

Judges.—Thomas Blagden, Washington, D. C.; Israel Boies, Homer, Gideon Ramsdell, Perington.

The premium, $50, for best team of 20 yoke, awarded to J. Barber, and others from Cortland Co. The first premium, $25, for best single yoke, awarded to E. Sheldon, Sennett, for pair 6 years old oxen. The second, $15, to John Bryden, Clinton, Oneida, pair Devon cattle, 4 years old. The third, trans. and $5, to Hiram Cleft, Marcellus, for pair 6 years old oxen. To I. B. K. Church, Vernon Center, Oneida, silver medal, for his most thoroughly trained, disciplined, and beautifully matched four years old Devon cattle. The judges highly commend the appearance and discipline of the oxen of Edward Munson, of Sennett, and of L. S. Bundy, of Otego, Otsego county; indeed, all the oxen exhibited, do credit to their owners.

The judges remark of the twenty yoke from Cortland Co., that they cannot adequately express their praise and admiration of this noble team, which is an honor to the county from which it comes. The animals are mostly Devons and Durhams, from four to seven years old, and several yokes of the team, had it been allowed, could well have competed for the first premium, for the best single yoke; and each yoke of the team, is remarkable for excellent appearance. The judges made their awards, after a careful examination, as to the several points of discipline, equality and evenness of weight, and match in those of the same yoke, form and size, as indicating constitution and ability to perform and endure labor, and general thrift and fattening tendency, indicative of the value of the animal for beef, when he is no longer wanted for labor.

Steers, 3 Years Old. 7 *Yoke.*

Judges.—J. C. Collins, West Turin; Otis Tracy, Horace Adams Rome.

The first premium, $15, for best yoke three years old steers, awarded to H. H. Eastman, Marshall, Oneida, grade steers. The second, $8, E. W. Sheldon, Sennett. The third, Trans. and $3, L. S. Bundy, Otego.

Steers, two years old. 8 *Yoke.*

Judges—J. D. Ledyard Jr., Cazenovia; Wm. Church, Coventry.

The first premium $10.00 for the best yoke of two years old steers, awarded B. H. Streeter, Galen, for his yoke of twin steers, (Native and Devon.) The second, $8.00, L. S. Bundy, Otego, for his Devon steers. The third, Trans. and $3.00, H. Sheldon Sennett. The judges remark that the steers to which premiums were awarded were well formed, closely matched, and well broken to the yoke, and superior in every respect. The rest of the steers presented were nice and thrifty cattle, well broke, and reflect credit on their owners and the State.

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STEERS, ONE YEAR OLD, (SAME JUDGES.) 3 *yoke.*

The first premium, $8.00, for best pair yearling steers, awarded to J. H. Sherrill, New Hartford. The second, $5.00. H. Sheldon Sennett. The third, Trans. and $3.00, to J. Muir, sen., Hamilton.

A silver medal is awarded to Mr. Muir, for best trained yearling steers.

FAT CATTLE, STALL FED. 9 *Yoke and* 12 *Single animals.*

Judges—Julius C. Thomas, Vermont; Daniel Atherton, Brighton, Mass.; Daniel Burroughs, Syracuse.

The first premium, $25.00, for best pair stall fed oxen, awarded L. Doty, Attica, pair grade cattle, (weight, 5,244.) The second, $15.00, E. Sheldon, Sennett, pair 5 years old Durhams, (weight, 4,850.) The third, $10.00, Asa Nowlen, Avon, pair Durham cattle 6 years old, (weight, 5,236.) (A pair of cattle on the ground weighing 5,400 lbs., belonging to Clement Leach, Eaton. Mad. co., are entitled to special notice, though not sufficiently fattened to receive a premium.)

The first premium, $15.00, for best single ox over 4 years, awarded Edward Munson, Sennett, (weight, 2,512.) The second, $10.00, Hiram Shelden, Sennett, (weight, 3,146.)

The first premium, $15.00, for best fat cow over 4 years old, awarded Clement Leach, Eaton, for his five years old spayed heifer, (weight, 2,066.) The second, $10.00, Robert Rone, Mt. Morris, for his 5 years old cow, (weight, 1,726.) The third, $6.00, to Robert Rone, for his 4 years old heifer, (weight, 1,942.)

The first premium, $15.00, for best pair fat steers under 4 years, Robert Rone, Mt. Morris, for his roan and gray short horn steers, (weight, 4,398.) (These steers are said by the judges, "taking all their superior qualities into consideration, they far exceed any thing of their age that ever came under their observation.")

The first premium, $10.00, for best single heifer under 4 years old, J. Barber, Homer, for his Durham heifer, (weight, 1,486.)

GRASS FED.

The first premium, $20 00, for best pair fat oxen over 4 years, awarded E. P. Beck, Sheldon, for pair 5 years old Devons, (weight, 3,464.) The second, $12.00, Israel Boies, Homer, for pair 4 years old grade steers, (weight, 3,398.)

The first premium, $8.00, for best single steer under 4 years, awarded E. Shelden, Sennett, (weight, 1,560.) The second, $3.00, John Reeves Lysander, (weight, 1,884.) The third, Trans., J. B. Burnet, Syracuse.

The first premium, $10.00, for best cow over 4 years old, awarded Robert Allen, Syracuse.

FAT SHEEP. 31 *Entries.*

Judges—Clement Leach, Eaton; Michael White, Daniel Burroughs, Syracuse.

The first premium, $5.00, for best middle wooled fat sheep over 2 years, awarded J. M. Sherwood, Auburn, The second, $3.00, to the same for his South Down wethers.

The first premium, $5.00, for best middle wooled fat sheep under 2 years, awarded Z. B. Wakeman, Herkimer, for his South Down wether. The second, Morrell's Shepherd, Robert Rone, Mt. Morris.

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The first premium $5.00, for best long wooled fat sheep over 2 years, John Reeves Lysander, for his Leicester wether. The second, $3.00 and Morrell's Shepherd, for a third, awarded Mr. Reeves.

James Bicknell, Aurora, Erie co., a special premium of $3.00, for a Bakewell ewe.

HORSES.

Class I. All work. 105 *Entries.*

Judges.—Hon. Adam Furgesson, Woodhill, C. W.; Ela Merriam, Leyden; Henry Ehle, Chittenango.

The first premium, $20, for best stallion over 4 years old, awarded Wm. Ferguson, Marshall, for his horse "Bay Kentucky Hunter." The second, $12, Nottingham & Allen, Palmyra, for their gray horse "Young Norman." The third, $8, Abram Butler, Walcott, Wayne county, for his bay horse "Don Juan." The fourth, "Youatt," O. Howland, Owasco, for his horse "Sir Henry."

The first premium, $20, for best brood mare and foal, awarded Reuben R. Burt, Palermo, for his sorrel mare and sorrel colt. The second, $12, to Edward Munson, Sennett, for his bay mare and bay colt. The third, $8, Anthony Decker, Skaneateles, for his chesnut mare and sorrel colt. The fourth, "Youatt," Mr. Prior, Eldridge, for his bay mare and bay colt.

The judges remark, that there were several other very superior animals exhibited, and they sincerely regret that the means at their command limited their awards. They must, however, particularly notice a very fine bay 4 years old, No. 107, ("Morgan Tiger," belonging to J. Gillett, Galen, Wayne county.) The mares and colts afforded much satisfaction. The judges consider this class of horses as one of very high value to the farmer, and to the public. Speed, combined with bone and bottom, are indispensable for satisfactory road work; and the judges cannot avoid noticing the happy union of these high qualifications in the old Morgan blood, which is undoubtedly near a kin to, and derived from, the French Norman stock. With the large, roomy mares of Pennsylvania, or with importations from the vales of Cleveland and Clydesdale, in Britain, a noble race of animals for harness will reward the judicious and intelligent breeder.

It is worthy of notice, as a matter coming frequently, almost uniformly, under the notice of the judges, that when an animal of superior qualities entered the trial ring, Morgan blood, less or more, formed a step in the pedigree; and this held good, even where the peculiarities of form and size had undergone material changes.

The judges take great pleasure in adverting to the improved arrangements for exhibiting stock at the present exhibition of the Society, and a grateful acknowledgment of the polite attention of the gentlemen who discharged the arduous duties of marshalls.

Class II. Draught 29 *Entries.*

Judges.—Jesse C. Dann, Sackett's Harbor; Stewart Austin, Coxsackie; Henry Rhodes, Trenton.

The first premium, $20, for best stallion, awarded Nottingham & Allen, Palmyra, for their horse "Young Sampson;" the second, $12,

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to Cornelius Schoby, Springport, for his horse "Young Alfred;" the third, $8, John D. Spinner, Herkimer, for his horse "Sir Henry Eclipse;" the fourth, "Youatt," J. S. Tompkins, Camillus, for his horse "Young Sampson."

The second premium, $12, for brood mare and foal, awarded David Wemple, Mohawk; the fourth, "Youatt," John S. Lamerson, Van Buren.

The judges remark, that some good specimens of horses designed for the use intended under this class, were exhibited, and they were embarrassed in deciding on the respective merits and qualifications of the animals, in some instances. Among the brood mares and foals were some very fine, and a greater number would have been awarded premiums, had the judges had them to bestow.

(It is proper to remark, that the brood mares and foals to which the first and third premiums were adjudged in this class, had been passed upon in the class of all-work, and were awarded premiums there; and as the Executive Committee had no means of ascertaining the merits of other animals not mentioned, no awards but the second and fourth in this class were made, which the Executive Committee much regret should have occurred from the exhibition, in different classes, of the same animals.)

Class III. BLOOD. 28 *Entries.*

Judges.—James R. Van Mater, Freehold, N. J.; John D. Stoothoff, Jamaica; James Bathgate, Westchester.

The horse "Consternation," owned by J. B. Burnet, Syracuse, was shown; but having received the first premium in 1845, a certificate is awarded him as the best horse on the ground.

The first premium $20, awarded to W. W. Huff, Buffalo, for his horse "Lance." The second, $12, Dow, Clark and Earl, Van Buren, for their "dark gray stallion." The third, $8, Simon Schermerhorn, Schenectady, for his horse "Young Waxy." The fourth, "Youatt," Pardon Austin, Manlius, for his horse "Young Eclipse." (The horse "Midas," owned by George Parish, Ogdensburgh, was exhibited without being entered on the books—had he been regularly entered he would have been entitled to the second premium, which the Executive Committee have since awarded.)

THREE YEAR OLD STALLIONS AND MARES. 27 *Entries.*

Judges.—Theodore S. Faxton, Utica; John B. Wheeler, Burlington, Vt.; Daniel B. Goodwin.

The first premium, $15, for best stallion, awarded A. Butler, Wolcott, for his chesnut horse "Young Mogadore, jr." The second, $10, E. Moore, Cherry Valley, for his brown horse. The third, "Youatt," H. S. Marsh, Syracuse, for his dark bay horse. The fourth, "Trans," Wm. Norton, Wayne co., for his sorrel horse. The first premium, $15, for best mare, awarded Elias Thomas, Oswego co., for his bay mare. None others exhibited which were considered by the judges of sufficient merit to receive a premium. The judges believe *that in all cases* the awards of the society when given, should be only on animals that are worthy of commendation.

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Two Year Old Stallions and Mares. 18 *Entries*

Judges.—Elias Cost, Phelps; Thomas Willis, Erie, Penn.; Abraham Per Lee, Norwich.

The first premium, $10, for best stallion, awarded Franklin Bowen, Ridgway. The second, $5, R. G. Arthur, Ticonderoga. The third, "Trans," J. Van Hoesen, Augusta.

The first premium, $10, for best mare, awarded John J. Bushart, Fonda, for his bay mare colt. The second, $5, N. R. Williams, Oneida co., for his bay mare colt. The third, "Trans," J. N. Holmes, Hastings. The judges remark, that the colts in this class were very superior.

One Year Old Colts. 10 *Entries.*

Judges.—Calvin Blodgett, Chelsea, Vt.; Albion Jackson, Wm. D. Knapp.

The first premium, $5, for best stallion colt, awarded J. Muir, senior, Hamilton. The second, "Youatt," Jacob Hansenfratz, Onondaga. The third, "Transactions," Nathan Souls, Clay.

The first premium, $5, for best filley, awarded N. B. Van Slyke, Sennett. The second, "Youatt," S. A. Gilbert, Hamilton, for his filly "Fanny Morgan."

Matched Horses. 39 *Entries.*

Judges.—James D. Wasson, Albany; Henry Delamater, Rhinebeck; Joshua T. Blanchard, Saratoga Springs.

The first premium, Diploma and $15, for best span, awarded to Harvey Gould, Albion, Orleans, for his bay horses. The second, $10, Thomas S. Clark, Orleans co., for his bay horses. The third, $8, Amos Lewis, Dryden, Tompkins co., for his five years old bay brown horses. The fourth, $5, H. Otis Jordan, for his five years old horses. The judges remark that the horses to which the third premium was awarded, but for their size, were inferior to none exhibited on the grounds. Great embarrassment arose in awarding the fourth premium, owing to the great equality of beauty and action, as well as close matching of at least a dozen pairs, to each of whom it would have afforded the judges great pleasure to have awarded a premium. They can only in this public manner express their opinion of their great value, worth and beauty, reflecting much credit to their owners, as well as to the Society and the State.

Geldings. 51 *Entries.*

Judges.—Benj. N. Huntington, Rome; George B. Rowe, Canastota; John Butterfield, Utica.

The *Certificate* of the society awarded to Arden Merrill, Rome, for his dapple gray horse, being the best horse exhibited. The first premium having been awarded to him in 1847.

The first premium, Diploma and $10 awarded H. L. Barker, Clinton, Oneida co., forhis bay mare. The second, $8, S. S. Vaughan, Jackson,

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Michigan, for his bay horse. The third, $6, John Legg, Skaneateles, for his dapple gray horse. The fourth, $4, Nelson Boomer, Jefferson co., for his chesnut horse. A vol. of Transactions awarded John B. Miller, Utica, for his bay horse; Wm. H. Saunders, Clyde, for his sorrel colt; W. C. Caapman, Aurelius, for his gray horse; H. Eaton, Syracuse, for his gray horse—all of these being excellent horses and entitled to special notice. The judges recommend that hereafter there be two classes of geldings. The horses exhibited have been much better, and also much larger in number, than usual, which shows the attention which is being given to the rearing of fine horses—than which no stock reared by the farmer gives a better return.

SHEEP.

Class I. LONG WOOLED. 54 *Entries.*

Judges.—George Miller, Markham, C. W.; Lewis G. Morris, Fordham; John Stevens, Lysander.

The first premium, $10, for best buck over two years old, awarded to George Swails, Sodus; the second, $8, Lewis F. Allen, Black Rock; the third, $5, Charles N. Hudson, Onondaga.

The first premium, $10, for best buck under two years, awarded Thomas Terry, Mt. Morris; the second, $8, Wm. Rathbone, Springfield, Otsego county; third, $5, Charles N. Hudson, Onondaga.

The first premium, $10, for best 5 ewes over 2 years old, awarded Thomas Terry, Mt. Morris; the second, $8, William Rathbone, Springfield.

The first premium, $10, for best 5 ewes under two years, awarded George Swails, Sodus.

The first premium, $8, for best 5 buck lambs, awarded James Bicknell, Aurora, Erie county; the second, Morrell's Shepherd, and $3, Thomas Terry, Mt. Morris.

The first premium, $8, for best 5 ewe lambs, awarded Charles N. Hudson, Onondaga.

Class II. MIDDLE WOOLED. 51 *Entries.*

Judges.—E. N. Thomas, Rose; Samuel Hecox, Buffalo; Warren Granger, Buffalo.

The first premium, $10, for best buck over two years old, awarded Z. B. Wakeman, Herkimer, (South Down); the second, $8, J. M. Sherwood, Auburn, (South Down); the third, $5, Lewis F. Allen, Black Rock.

The first premium, $10, for best buck under two years, awarded J. M. Sherwood, Auburn (South Down); the second, $8, Wm. Robson, Westmoreland, (Bakewell); the third, $5, Z. B. Wakeman, Herkimer, (South Down.)

The first premium, $10, for best 5 ewes, over 2 years, awarded Wm. Robson, Westmoreland, (Bakewell); the second, $8, Z. B. Wakeman, Herkimer, (South Down); the third, $5, J. M. Sherwood, Auburn, (South Down.)

The first premium, $10, for best 5 ewes under 2 years, awarded Z. B. Wakeman, Herkimer, (South Down); the third, $5, E. R. Dix, Vernon.

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ONE YEAR OLD Sheared 104 lbs

ONE YEAR OLD Sheared 144 lbs

Tall Bred Merino Sheep

The first premium, $8, for best 5 buck lambs, awarded Z. B. Wakeman, Herkimer, (South Downs); the second, Morrell's Shepherd and $3, Wm. Robson, Westmoreland, (Bakewell.)

The first premium, $8, for best 5 ewe lambs, awarded Z. B. Wakeman, Herkimer, (South Downs); the second, Morrell's Shepherd and $3, Wm. Robson, Westmoreland, (Bakewell.)

The judges remark, that the South Downs' and Bakewells exhibited were superior animals, and it was with much difficulty that the judges arrived at a satisfactory decision, after a thorough examination and re-examination of the sheep exhibited.

Class III. MERINOES AND THEIR GRADES. 122 *Entries.*

Judges.—James G. Strean, Washington, Penn.; Samuel Whitman, Hartford, Conn.; A. C. Russell, Kirtland, Lake county, Ohio; R. C. Otis, Southport, Wisconsin; J. F. Gilkey, Kalamazoo, Michigan.

The first premium, of $10, for best buck over two years old, awarded N. M. Hart, Harpersfield; the second, $8, Joseph Blakeslee, North Salem, Westchester co.; the third, $5, J. M. Sherwood, Auburn.

The first premium, $10, for best buck under two years, awarded J. D. Patterson, Westfield, (this thorough bred Merino buck highly commended by the Judges); the second, $8, Daniel S. Curtis, Canaan; the third, $5, J. M. Sherwood, Auburn.

The first premium, $10, for best 5 ewes over two years old, awarded J. M. Sherwood, Auburn; the second, $8, N. M. Dart, Harpersfield; the third, $5, Randall & Milliman, Clay.

The first premium, $10, for best 5 ewes under two years, awarded Joseph Blakeslee, North Salem.

Class IV. SAXONS, AND THEIR GRADES. 159 *Entries.*

Judges.—Roswell Carter, Chicago, Illinois; Thomas Reed, Ohio; Chester Palmer, W. R. Sanford, Vermont; Rawson Harmon, jr., Wheatland.

The first premium, $10, for best buck over two years old, awarded Samuel H. Church, Vernon; the second, $8, Silas B. Crocker, Vernon; the third, $5, Samuel H. Church.

The first premium, $10, for best buck under two years, awarded Silas B. Crocker, Vernon; the second, $8, R. J. Ransom, Hoosick; the third, $5, Joseph Haswell, Hoosick.

The first premium, $10, for best 5 ewes over two years old, awarded Samuel H. Church, Vernon; the second, $8, Silas B. Crocker, Vernon; the third, $5, Randall & Milliman, Clay.

The first premium, $10, for best 5 ewes under 2 years, awarded R. J. Ransom, Hoosick; the second, $8, Samuel H. Church, Vernon; the third, $5, Randall & Milliman, Clay.

SHEPHERD'S DOG.

First premium, $5, M. Bingham, Vermont, for his well trained shepherd's dog, "Cammer."

FINE WOOL.

Samples of wool, from the late importations of Messrs. Catlin and Smith, Wolcotville, Ct., (from the flock of Baron de Speck, Lictschena,

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near Leipsic,) were exhibited, and for *evenness of fibre, fineness and thickness of fleece*, they are beautiful, indeed. The judges congratulate the Society upon the large number of valuable sheep exhibited. It is recommended that hereafter, a separate committee be appointed for grade sheep, as the judges were much embarrassed in passing upon grades, which would not have been the case had they been confined either to full-blooded or to grades. Many of those exhibited partook more of other breeds than of the Saxon. The judges regret that only two pens of lambs were exhibited, and those not worthy of the premiums of the Society, which imply, and should only be awarded to, superior animals. The judges would urge upon the Society the vast importance to the interests of agriculture, that the breeding of superior Saxon sheep should be extensively encouraged, as they are a very important and valuable race of sheep; but they would discourage as much as possible the raising of inferior fine wooled sheep. A desirable Saxon sheep should be short-legged, square built, carrying a high head, with a round neck and clean dew-lap, and straight on the back. The wool should be soft, fine, close crimped, thickly set, and even on the whole carcass, combining length of staple. It is recommended, that hereafter the sheep should be shorn, except a lock upon the shoulder, left for a sample.

THE HARTFORD PURSE OF $100.

A gentleman of Connecticut offered a premium of one hundred dollars for the best twenty-five full blood Merino ewes, and for the best twenty-five full blood Merino lambs, less than one year of age, all owned by one person, free from any Saxon cross, and must have been shorn within the present year, regard being had to size and constitution, with quantity and quality of wool.

The committee appointed to examine this kind of sheep, according to the above prescribed conditions, report:

"That but one lot was offered; that the sheep examined were very large, well formed Merino sheep of the Taintor importation, with heavy even fleeces, of a medium quality of wool. The committee would not recommend them in preference to every other kind of sheep, but would recommend them to the farmers for trial.

"They award the above premium to A. L. Bingham, of Cornwall, Vermont."

J. F. BEEKMAN,
THOMAS REED,
AUGUSTUS SANFORD,
CHESTER PALMER,
HOMER BLANCHARD.
Committee.

SWINE. 31 *Entries.*

Judges.—Benjamin Enos, De Ruyter; Benjamin French, Alfred Mitchell.

The first premium, $10, for best boar over one year old, awarded James Gilkerson, Homer; the second premium, $5, for boar over two years old, awarded H. W. Washbon, Butternuts; the second $5 for one year old, awarded David Preston, Elbridge; also $5 to B. Williams,

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Onondaga; for second best boar, 6 months old, $3, C. R. Nichols, Bethany; the premium of $5 for second best breeding sow over 1 year old, awarded Franklin Thayer, Darien; for second best, 6 months old, $3, to same.

For best lot of pigs, $10, Rufus Cossett, Onondaga; and for second best, $5, H. N. Washbon, Butternuts.

The judges remark, that the swine entered, were not such as in their judgment to entitle them to the first premium. The object of the Society is to encourage the breeding of *first rate animals*, and for such they are willing to award liberally; but to award the first premium for *second rate animals*, cannot but prove injurious to the Society, as well as to breeders.

Poultry.

Judges.—C. N. Bement, Albany; Samuel Woolworth, Homer; A. G. Percy, Wayne county.

Best lot Poland fowls, $3, S. J. Cheeseboro, Syracuse; best lot of large fowls, $3, John J. Bushart, Fonda; best Muscovy ducks, $3, Charles N. Hudson, Onondaga; best large geese, (Bremen) $3, Davis Cossett, Onondaga; best lot Java bantams, $3, E. E. Platt, Albany.

FOREIGN STOCK.

Cattle.

Judges.—Adam Furgesson, Woodhill, C. W.; H. Parsons, Guelph, C. W.; E. P. Prentice, Mount Hope.

The judges on foreign cattle cannot take upon themselves to decide the relative merits of different breeds of animals, but have no hesitation in saying that, of the Herefords presented for competition, they give the preference to the bull "Fitz Favorite," owned by L. G. Bingham, Cornwall, Vt., a diploma and $25; and of Devons, to the Devon bull No. 290, owned by Richard C. Gapper, Thornhill, C. W., diploma and $25. There was also presented for competition a red short-horn bull, from York township, Can. W., owned by James Nightengale, entitled to commendation, but the judges do not deem him of so decided excellence as to merit, or to receive a special premium. Of other breeds and grades there were none offered.

Of two year old bulls, there was but one presented, and he was not considered to possess any extraordinary excellence, and a premium is not awarded.

Of one year old bulls, the premium diploma and $10, is awarded to the Hereford bull "Priam," owned by M. Bingham, Cornwall, Vermont, and a premium of diploma and $5, to Richard C. Gapper, for his Devon bull calf.

The first premium, diploma and $25, awarded to L. G. Bingham, Vermont, for his Hereford cow "Sally;" and the second premium to the same, for his Hereford cow "Cherry."

Having been also appointed judges on *sweepstakes*, by which, we understand, it is expected that we decide the relative merits of different breeds of animals presented. In their simplicity they entered upon the discharge of this very onerous duty, but they soon found it environed with so many difficulties as to entirely preclude the hope of any useful or satisfactory result. They ask, therefore, to be discharged from further duty as such committee, and would recommend to the society that hereafter this class be dispensed with.

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HORSES.—16 *Entries.*

Judges.—Adam Furgesson, Woodhill, C. W.; Ela Merriam, Leyden; Theodore S. Faxton, Utica.

The first premium, diploma and $20 awarded L. D. Harlow, Hartland, Vermont, for his 4 year old stallion, "Morgan Gray Hawk." The second, $15, J. Ashford, Toronto, C. W., for his bay stallion. The third, $8, Calvin Blodget, Chelsea, Vermont, for his chestnut Morgan stallion, "Major Gifford." The fourth, "Youatt," G. F. Wheeler, Middlebury, Vermont, for his 5 years old chesnut Morgan stallion.

The first premium, diploma and $25 for best mare, awarded to Calvin H. Blodget, Chelsea, Vermont, for his 7 years old Morgan mare, "Julia Kidder."

A bay colt, 2 years old, owned by G. A. Austin, Orwell, Vermont, and a sorrel colt of the same age, owned by H. H. Hall, Bridport, Vermont, was, in the opinion of the judges, as fine colts as ever have appeared in competition at our Fairs, and do great credit to their breeders, and worthy of the special commendation of the society, and a diploma is recommended to each.

SHEEP, LONG WOOLED.

Judges.—Sanford Howard, Albany; H. Blanchard, Kinderhook; S. H. Church, Vernon.

The first premium, diploma and $10, for best buck, (Leicester,) awarded George Miller, Markham, C. W.; and first premium, diploma and $5, each, for best buck and ewe lambs, to the same.

MERINOES.

The first premium, diploma and $10, for best buck, awarded E. Robinson, Shoreham, Vermont; and the first premium, diploma and $10, for best 5 ewes, divided equally between M. Bingham and E. Robinson, Vermont. A diploma awarded L. G. Bingham, Vermont, for a very fine Saxon ewe exhibited by him.

N. B.—Mr. Robinson entered two bucks, viz: one bred by Mr. Taintor, and the other bred by himself, of the "Jarvis" stock; the premium is awarded to the latter.

PREMIUMS OPEN TO ALL.

HORSES.

Judges.—Hon. Adam Furgesson, C. W., Ela Merriam, Leyden, T. S. Faxton, Utica.

The first premium for best stallion, a diploma awarded Nottingham & Allen, Palmyra, for their gray stallion, "Young Norman." The first premium for best brood mare, a diploma awarded C. H. Blodgett, Chelsea, Vt., for his chesnut "Morgan" mare.

SHEEP.

The committee consisting of Messrs. Blanchard, Howard, and Church, report: That they award to George Miller, Markham, C. W., for the best long wooled buck, a diploma; and to the same, for the best five buck lambs, a diploma. There were some other entries in this department, but no awards for want of sufficient excellence.

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FARM IMPLEMENTS.

No. 1. *Entries.*—5 wagons, 9 harrows, 16 corn cultivators, 7 fanning mills, 10 corn stalk cutters, 38 straw cutters, 3 corn and cob crushers, 1 clovermill, 1 ox cart, 8 horse rakes, 6 ox yokes, 12 rye hooks.

Judges.—Amos Briggs, Schaghticoke; John West, Rome; John Lee, Cambridge.

The first premium, diploma and $5, best farm wagon with patent couplings, awarded D. W. Seeley, Carlisle, Schoharie; best harrow, diploma and $3, A. H. Fitch, Livingston co., (cast iron;) best corn cultivator, diploma and $3, Jeremiah Fink, Lysander; best fanning mill, diploma and $5, Jacob Clapper, Fort Plain; best corn stalk cutter, diploma and $5, J. C. Rich, Penfield; best straw cutter, diploma and $3, J. C. Rich, Penfield; best corn and cob crusher by horse power, diploma and $5, H. L. Emery, Albany; best clover machine, diploma and $5, Rapalje & Briggs, Rochester; best ox cart, diploma & $3, Paris Barber, Homer; best horse rake, diploma and $2, R. H. Chase, East Livermore, Maine, (independent horse rake;) best ox yoke, diploma and $2, Gideon Hotchkiss, Windsor, Broome county.

The farm wagon of Mr. Seeley is considered a very valuable improvement. It consists in a new method of coupling the bolster and fore-axles or spring-blocks of farm wagons, and four wheeled carriages of every description, and is a complete substitute for the block tongue, hounds, and king bolt, as generally used. The coupling being effected by the use of two metallic circular plates, bolted one to the bolster and perch, and the other to the axle, which are connected together by a bolt of a peculiar shape, in such a manner that the axle cannot be separated from the body of the carriage without first removing one of the fore wheels, and turning the axle at right angles with its working position. A model wagon is deposited in the museum at the Agricultural Rooms.

No. 2.—*Entries*, 1 carriage harness, 2 saddles, 16 axes, 27 churns, 9 cheese presses, 20 grain cradles, 18 rakes, 66 hay forks, 30 grass scythes, 8 scythesnaths, 14 cradle scythes, 64 manure forks, 1 hay rack, 1 butter tub, 18 potato hooks, 6 fruit pickers, 24 toy hoes and rakes, 18 hoes, 3 meat cutters, 2 sausage stuffers, 2 grafting knives, 1 refrigerator, 1 horticultural tool chest, 6 transplanting trowels, 6 pruning saws, 7 scoops, 18 shovels and spades, 1 washing machine, 1 double action lift force pump, 1 corn mill, 1 round scraper, 3 cedar pails, 6 ox-bows, 1 wool press, 1 fence cap augur, 1 corn and cob grinder, 38 brooms.

Judges.—Amasa S. Newbury, Waterville; Daniel Kenyon.

For best carriage harness, first premium, diploma, and $3, awarded Moses Cherry, Utica; best saddle for general use, diploma and $2.00, B. Suit, Chittenango; best dozen axes, medal and $2.00, D. R. Barton, Rochester; best churn, diploma and $2,00, E. R. Dix, Vernon; best cheese press, "Potter's patent," diploma and $2,00, L. Raymond, Trumbull co., Ohio; best grain cradle, diploma and

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$2,00, Charles Clow, Port Byron; best six hand rakes, diploma and $2,00, H. L. Emery, Albany; best six hay forks, diploma, and $2,00, J. Van Ornam, & Co., Brookfield, Vt.; best six grass scythes, diploma and $2,00, H. C. White, Mohawk; best six cradle scythes, diploma and $2,00, Rapalje & Briggs, Rochester; best six manure forks, (Partridges,) diploma and $2,00, Rapalje & Briggs; best hay rigging, diploma and $2,00, J. M. Ransom, Onondaga; best corn brooms, diploma and $2,00, G. W. J. Brownson, Amsterdam. Disc., best saddle exhibited of superior finish and workmanship, diploma and silver medal, R. T. Norgrove, Syracuse; diplomas to Rapalje and Briggs, for 6 potato hooks, horticultural chest and tools, and Transactions, for Boston refrigerator, wooden scoops, six ox bows; diplomas, H. H. Babcock, Unadilla Forks, for 3 of Clark's cast steel hoes; James P. Hitchcock, Truxton, fence cap auger; Burdick & Cushing, Glens Falls, sausage meat cutter; Butterfield & Greenman, Utica, for corn and cob crusher.

No. 3.—*Entries:* 16 horse powers, 14 thrashing machines, 6 seed planters, 7 wheat drills, 1 grain drill, with apparatus for manure, 1 cultivator and drill, 1 broadcast sower, 5 wheat cultivators, 1 portable saw mill, 1 corn sheller, horse power, 12 corn shellers, hand power, 4 vegetable cutters, 4 grain reapers, 1 mowing machine.

Judges.—Charles Lee, Penn Yan; Dr. Kennicutt, Elm Grove, Illinois, George Buckland, Toronto, C. W.

For best horse power for general purposes.—Diploma and $5, L. B. Benton, Penn Yan; diploma to H. E. Smith, Fowlerville, for iron horse power; best thrashing machine, diploma and $10, B. G. H. Hathaway, Starkey; best seed planter, for hand or horse power, diploma and $3, (Emery's,) Rapalje & Briggs; best corn planter, diploma and $3, (Batcheldor's,) Rapalje & Briggs; best wheat drill, diploma, (Palmer's,) Aaron Palmer, Brockport.

Diplomas awarded.—Darius W. Yeomans, Cairo, for wheat drill, containing new principle; J. Atkins, Brockport, for grain drill and corn planter, of high merit; P. Seymour, East Bloomfield, best grain drill, with apparatus for depositing manure; Silas S. Sage, Windsor, Broome co., for best broad-cast sower; D. B. Rogers, Seneca Falls, best wheat cultivator; H. L. Emery, Albany, best portable saw-mill, (Emery's); same, best corn sheller, horse power, (Smith's,); Darius W. Harris, Yorkshire, Cattaraugus co., best corn sheller, hand power; Rapalje & Briggs, Southern corn sheller; Ruggles, Nourse & Mason, Boston, best vegetable cutter—exhibited by Rapalje & Briggs, and H. L. Emery; E. J. Burrell, Geneva, best grain reaper, for general purposes and the farming interests of New-York; C. H. McCormick, Chicago, Ill., Virginia reaper for extensive farmers, is highly recommended, and well worthy the diploma of the Society; G. S. Barber, horse power, Lyons, Wayne county, entitled to special notice; Ketchum's mowing machine, having heretofore received the first premium, is awarded a certificate for its superior merit; Rapalje & Briggs, Rochester, diploma and $20 for best and most numerous collection of agricultural implements; E. J. Burrell, Geneva, diploma and $20 for best and most numerous collection of agricultural implements manufactured in the State, by exhibitor; H. L. Emery, Albany, for his collection of agricultural implements, on account of their superior quality and finish, a diploma.

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A DESCRIPTION OF PREMIUM IMPLEMENTS.

Drilling in Wheat and other Grain.

The advantages claimed for drill culture are:

1. *A saving of seed.*—Five pecks of wheat drilled in is equal to two bushels sowed broadcast; every kernel is neatly covered at a uniform depth.

2. *A saving of labor.*—Any person that can manage a team can complete in the neatest manner from ten to fifteen acres per day.

3. *An increase of crop.*—Small ridges of earth are left between the rows of wheat, which by the action of the frost slides down and covers the roots, thereby preventing *winter killing*. Light and heat are admitted between the rows and prevent injury by rust. A vigorous growth is given to the young plant, and its position in a constantly moist place prevents injury from drought.

Palmer's wheat drill—To which was awarded the first premium, as the best wheat drill presented at the late exhibition of the Society. The advantages claimed for this drill are,—That it possesses all the advantages of every other drill in use, and is at the same time free from their imperfections. It performs its work in the handsomest manner, is not liable to be injured by coming in contact with fast stones or roots, and can be used upon quite rough ground. It is simple and substantial in its construction. The teeth—any one or more of them—can be raised so as to pass over stones or other obstructions a foot and a half high, and by a simple contrivance, held in that position at the pleasure of the operator. By a slight movement the whole internal structure of the drill can be seen, and during the operation of sowing the seed is in full view of the operator. It is also adapted to planting corn, peas and beans in drills, and sowing other small grain as well as wheat. Manufactured by Palmer, Brockport, N. Y.

Grain drill and corn-planter, known as "Atkin's seed sower, manufactured by Fitch, Barry & Co., Brockport, Monroe co.

This implement was very highly commended at the late exhibition of the Society, and the following description is given of it: It is claimed to sow wheat, oats, barley, buckwheat, peas, and to plant corn in hills, all of which this drill is said to accomplish in the most perfect manner. The frame is nearly square, with two front and one rear rail, and two side and two middle ones, with a hopper resting on the frame. The axle is of wrought iron with cog gearing on each end, one for propelling the distributors for sowing wheat and other small grain, and the other to propel the same distributor for planting corn in hills; the distributors are of cast iron and placed directly under the hopper, and so constructed as not to cut the grain; there are two ground wheels of 4 feet diameter. The drills or teeth are each attached to a wrought iron beam about 3 feet in length, these beams are hung on hooks fastened to the front rail, thereby giving the drill teeth a chance to undulate with the ground; there are two rollers laying horizontally in the frame on the

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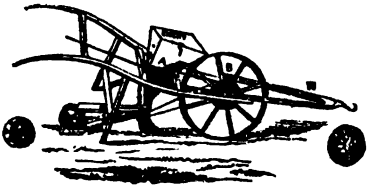
back side of the hopper, and each drill is attached to these rollers and by a handle in the frame hitched to the rolls, the teeth are lifted from the ground, each distributor has a separate slide to shut off the grain, and the sowing can be entirely stopped by throwing the distributors out of gear, which is done by pushing a handle very conveniently placed for that purpose. Price from $60 to $65.

Seymour's Grain Drill, with apparatus for depositing manure, to which first premium awarded. This machine combines the advantage of sowing in drills or broad cast, and of depositing manure with the seed. Its construction is such, that the drill teeth and all the fixtures necessary for drilling, and not needed for broad-cast sowing, can be removed in five minutes, and a complete broad-cast is left, ready for sowing any kind of grain, plaster, &c. Wet wheat, oats or white caps in the wheat which so readily clog many machines, are no obstacle in this; and those who prefer thrashing their wheat for seed with the flail, to avoid the injury done to the seed by thrashing with a machine, will find this drill suited to their wants. When drilling with this machine, the grain falls from the hopper to the tubes, (a space of about six inches,) in full view of the person attending it, so that in case of any obstruction, it is immediately noticed and can be readily removed.

EMERY'S SEED DRILL BARROW AND CORN PLANTER.



The above cut represents the improved drill barrow, with attachment H, for planting corn, beans, &c. It is light, strong and durable, and can be used by one man, as its whole weight will not exceed 70 lbs., or can be drawn by a horse, when a large amount of work is to be done. It is at once simple, strong, and easily managed, and equally well adapted to drilling or planting in hills admitting, by a simple contrivance, of 28 variations of distance between hills, from 3 inches to 8 feet, and drops from one to any required number in a hill. It admits of the same number of variations for drilling, planting the smallest, largest and most difficult seeds with great precision. Being worked by gear instead of hand, it never fails by slipping when in motion. It can be thrown out of gear when desirable to stop its action. Its advantages are, precision, making its own furrow, measuring, dropping and covering, and compressing, all at one operation. It will plant from 10 to 13 acres per day.

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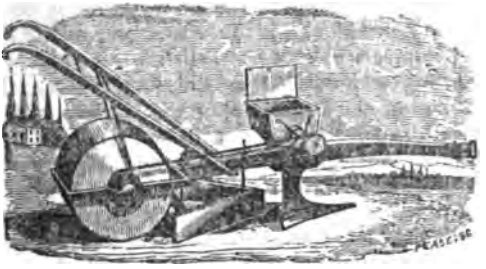
BACHELDOR'S CORN PLANTER.



The general form is similar to a plow without mould-boards, with a hopper placed upon the beam. The seeds are dropped by two wooden slides or arms, which are moved alternately by a crank motion in and out of the bottom of the hopper, these arms having cups or cavities which are filled with corn, and as they are drawn out over the pipe or tube, are dropped into it and fall to the ground beneath the share. Price, $15.00.

PLOWING MATCH.

28 *Entries.*

Judges.—Wm. Ottley, Phelps; Hugh Brodie, Cote St. Pierre, C. E.; J. P. Fogg, Rochester; Micah Bradley, Salina; Lewis W. Cleveland, Skaneateles.

The first premium, $10, awarded E. Davis, Watertown, Jefferson county; the second, $8, W. G. Brainerd, Rome, Oneida county; the third, $5, Samuel Phillips, Onondaga; the fourth, Transactions, H. D. Preston, Elbridge; and the same to Sam'l Lyderman, Geneva; Enoch Marks, Fairmont; O. Howland, Cayuga; Thomas Miller, Homer; J. F. Moschell, Clay; Wm. Willett, Onondaga; Rich'd Taylor, Mottville; Thomas Mix, Auburn; N. Kniffen, Scipio; John Becker, Parish, Oswego; J. Potter, Onondaga Hill; J. T. Hill, Lenox; Wm. Heming, Onondaga; John Morris, Onondaga.

The plowing, in the opinion of the judges, as well as of the numerous spectators present, was pronounced the best which has ever been performed at our State Fairs. The ground was very dry and hard, yet the work was most thoroughly performed, with great neatness and perfection; showing not only the skill of the plowmen, but the superiority of the plows used It is believed, that in no branch of farm labor, has more improvement been made; and every intelligent farmer is satisfied, that unless this important branch of farm labor is properly performed, he cannot expect to succeed as he should in his crops. It is hoped that the Society will increase its premiums, and require the kind of plows used to be entered by each competitor, as well as the name of the plowman; and that premiums be awarded to the plowman, as well as to the person who enters for competition.

PLOWS.

Judges.—A. Van Bergen, Coxsackie; Wm. Buel, Rochester; Sanford Howard, Albany.

The premium, diploma and $8, was awarded to E. J. Smith, Delhi, Delaware county, for best side hill plow; diploma and $5 to A. A.

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Sweet, Pompey, for best roller for general use: a valuable roller, which excited much interest.

The number of plows entered for trial were 56, by 22 competitors.

From the great number of persons in attendance at the Fair at Syracuse, it was found impracticable to have such a test of plows as was required by the Society and desired by the competitors. The judges, with the approbation of the President of the Society, and also of the competitors generally, accepted of an invitation tendered by the officers of the Oneida County Agricultural Society, and adjourned the trial to the Oneida County Fair, to be held on the 25th September, at Hampton. Mr. Sanford Howard was the only member of the committee who attended (the other members having been prevented by unforeseen engagements from being present.) Mr. Howard laid the matter before the competitors, ten of whom were present, and with their approbation the trial was abandoned, much to the regret and disappointment of the public.

The Executive Committee feel the importance of a thorough trial of plows, and in order that the same may be obtained, they would suggest to their successors the propriety of selecting a week in the month of June for the trial. By this method, proper regulations to govern the trial being adopted, the value of the different plows in use, for the various soils and crops, may be ascertained with reasonable certainty, and great good result to the agricultural interest. By selecting this season of the year, the judges will have ample time to conduct their examination, until each competitor is satisfied, and the results of the trial when published, will, after such a trial, be far more likely to secure the confidence of the public, than a hundred trials made at the Annual Fairs.

DAIRY.

BUTTER—*40 samples. Entries* 12, *by girls under* 21 *years.*

Judges.—Joseph Cary, Albany; Ebenezer Robbins, Lee; E. R. Evans, Marcy.

For best lot from 5 cows in 30 days. Nelson Van Ness, of Mayville, Chautauque county, made 221 lbs.; and John Holbert, of Chemung, 264½ lbs. The statement of Mr. Holbert having been mislaid, was not before the judges, and they awarded the first premium, of $25, to Mr. Van Ness.

The Executive Committee, on examining the statement, and the judges having certified as to the superior character of the butter of Mr. Holbert, award him the same premium of $25, which he would have received from the judges had his statement been before them.

Statement of John Holbert, Chemung; 5 cows, native breed, with slight mixture of Durham; fed on grass only, and owned previous to first February, 1849. Statement as to weight, milk and butter, and verified by the affidavits of Edmond Brown and Mary O'Grady, and by Mr. Holbert: Method of manufacture, (vide Trans, 1848, page 271. Salt used, Turk's Island and sack salt.)

Chemung, May 23d, 1849.

Began to weigh the milk and butter of five cows:

1st	184 lbs. of milk,	8½	of butter.	16, ...	8½
2,	.....	8½	"	17, ...	9
3,	.....	8½	"	18, ...	9

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4,	9	"	19,	9	
5,	8½	"	20,	9	
6,	8¾	"	21,	8¾	
7,	8½	"	22,	8¼	
8,	9	"	23,	9	
9,	8½	"	24,	9	
10,	8¾	"	25,	9	
11,	9	"	26,	8½	
12,	9	"	27,	8¾	
13,	8¼	"	28,	9	
14,	9	"	29,	8¼	
15,	8¾	"	30,	9	
	131			133⅛	
				131	
			Lbs. of butter,	264⅛	

June 21st, 122 lbs. of milk, made 9 lbs. of butter.

Statement of Nelson Van Ness, Mayville, Chautauque, verified by certificates of Ann Van Ness, Marcus Van Ness, and Lydia A. Van Ness, that the rules of the Society had been complied with, and 221 lbs. of butter made in 30 successive days. Mr. Van Ness certifies that their statement is correct, and that the five cows above mentioned were owned by him one year previous to the time of trial, and that they were the common native breed of cows, and were fed with nothing but pasture during the whole of the trial, (no grain slops, nor roots, nor corn stalks, were fed.)

Weighed the milk on the 11th of June,	185 lbs.
Weighed, on the 19th of June,	205
Again, on the 25th,	190
Weighed last, the 2d July,	167
Weight for four days,	747 lbs.

The milk was set in tin pans, and sat from 36 to 48 hours, till it soured, then skimmed and churned every day, the butter put into the worker, till the butter-milk was freed from the butter, then salted with 1 oz. of salt to the pound of butter, then put into a bowl covered so as to exclude the air from it, and set in a cool place till the next day, then put into the butter worker and worked till sufficiently dry, then packed into the tubs, all of the time taking care to keep it from the air as much as possible. The above cows were milked three times a day; milk weighed about eight pounds to the gallon; the latter part of the trial the weather became hot and dry, and reduced the amount of milk and butter; salt used from the Pacific Rock Salt Company.

For the best 25 lbs., made in June, $10, awarded John Shattuck, Norwich, Chenango county; second, $5, John F. Clark, Onondaga; third, Transactions, Abram Adams, Preble, Cortland county.

John Shattuck's statement.—Keeps twenty cows. The milk is strained in tin pans as soon as drawn, and kept on racks in the milk room, until the cream is removed, which is always done in hot weather before any

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whey appears, and in cool weather, before the milk begins to turn bitter. The cream is kept as cool as possible after it is taken from the milk, and the sooner it is churned, the better. Churn every morning in warm weather, tempering the cream with ice, so as to have it gather well and hard, when it is readily freed from the butter-milk. We use in warm weather ice water, to rinse the butter, when it is removed from the churn, the butter-milk worked out clean, and salted with ground rock salt, (about one lb to twenty lbs. butter,) and thoroughly worked, and set in a cool place about 24 hours; and again worked, so as to entirely free it from butter-milk, and packed in firkin, and covered tight, so as to exclude the air, until the firkin is filled. No other substance used in making butter. Cows kept on common pasture. The mode of keeping butter through the season is, as soon as a firkin is filled, to spread a cloth over the butter, and cover it with a strong brine made of ground rock salt.

John F. Clark, Onondaga. Butter made last week in June and first in July, from five cows kept on pasture, with abundance pure water. The milk stood in a cool room, in tin pans, until it was lobbered, say from 36 to 48 hours, when the cream was taken off, placed in a jar in a cool cellar, and there kept until a sufficient quantity was obtained to make about 15 lbs. of butter, then churned at a temperature of about 55 degrees Fahrenheit. The butter was then salted with Onondaga dairy salt, at the rate of one pound to twenty of butter; then after standing twenty-four hours, was worked in a lever butter-worker, and after standing twenty-four hours longer, made perfectly free from butter-milk in the worker, and then packed in the firkin.

Abram Adams, Preble, his butter salted with Ashton salt, two lbs. salt to 50 lbs. of butter, no other substance used in making.

For best 50 lbs. butter made at any time—$15 awarded Horace Clapp, Houseville, Lewis co.; second, $10, John Holbert, Chemung; third, $5, John Shattuck, Norwich; fourth, Transactions, Noah Hitchcock, jr., Homer, Cortland co.

Statement Horace Clapp.—We milk 40 cows, which average about 165 lbs. of butter each during the season; we do not design to have the milk sour; churn every day; milk room averages during warm weather from 58 to 62°; as a general rule the milk stands from 36 to 48 hours, (governed somewhat by the weather;) use the Bonaire ground salt, 6 lbs. to 100 lbs. of butter, during warm weather, and less in autumn; use for working butter what is called a "butter worker," which is preferable to the hand; use no saltpetre or any substance but salt; the sample offered at the fair was made the 5th Sept.

Manner of keeping cows.—I feed nothing but hay during winter, and grass in summer; I keep salt in a close trough that the cows may have access to it at all times.

Breed of cows —Native, with one-fourth Durham.

Manner of preserving butter through the summer.—Cover (with the above salt) the surface one-half inch thick, moistened with strong brine, and kept *wet* during warm weather.

Manner of keeping cream before churning.—Cream put in a tin vessel, (made for that purpose,) and set upon ice inclosed in a box, made for that purpose, to cool to a proper temperature for churning, 55 to 58°.

Statements of Mr. *Holbert* and *Shattuck*, have been given.

Noah Hitchcock, Jr.'s statement.—The butter presented, was made the

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past week, 19 cows were milked at the time. These cows ran to the pasture, with a foddering of corn once a day. The milk was taken from the cows, morning and evening, and placed in pans in the cellar, and permitted to stand till it began to thicken; the cream was then taken from the milk, and kept about twelve hours before churning; a dash churn is used. The churning performed by a dog, usual time of churning, from 2 to 3 hours. The butter is then taken from the churn, and the buttermilk as nearly worked out, as it well can be with a butter worker; when about 3½ lbs. of Ashton's imported Liverpool salt is added to 50 lbs. of butter, and well worked in. It is then left to stand some 12 hours, and worked again, and in about the same length of time, it is again worked, and then put down in the jar. No saltpetre, or any other substance was added to the butter.

Girls under twenty-one years of age.

The first premium, a silver cup, awarded Miss Cordelia M. Bardwell (14 years of age,) Otisco, Onondaga Co. The second, pair silver butter knives, Miss Susannah Van Ness, (13 years of age,) Mayville, Chautauque Co. The third, a set of silver tea spoons, Miss M. E. Hopkins, Cortlandville, Cortland Co.

Miss Bardwell's statement.—The manner in which the butter was made by me, is as follows: The cream was taken from the milk as soon as it had sufficiently separated from the milk, which was nearly 36 to 48 hours. It was then put into the churn soon after, and churned in Chapin's crank churn; then taken out, put into the machine for working butter. The buttermilk worked out, then salted with rock salt, ground fine; let the butter stand 12 or 14 hours, then put into the machine, and worked again, until the third time. There was no saltpetre in it, nor no other ingredient except pure rock salt.

Miss Hopkins, Cortlandville, Sept. 8th, 1849.—*Treatment of Milk.*—I strained the milk in tin pans, placed them on racks in a cool cellar, and let it stand until the cream was sufficiently risen, which was 24 hours; then separated the cream from the milk, and let it stand a short time, and then churned it.

Treatment of the Butter.—Washed the butter with cold water, until it showed no color; then worked it as dry as possible; then weighed it, and added 1 oz. of Ashton sack-salt to a pound of butter; then worked it again, until prepared for packing.

The judges, in alluding to the character of the butter on exhibition, remark, that there were many other good samples of butter worthy of favorable consideration, and it was with much hesitation and consideration that the foregoing awards were made.

(Of the competitors who state the kind of salt used, thirteen used foreign salt; and five, salt from the salt works of this State.)

CHEESE. 20 *Entries.*

Judges.—Hon. Thomas Burch, Little Falls; S. D. Moody, Canton, St. Lawrence county; H. Davenport, Denmark, Lewis county.

The first premium, $15, for cheese less than one year old, awarded R. D. Brown, Fairfield, Herkimer county; the second, $10, P. Carter,

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Lysander; the third, $5, Samuel Mathews, Litchfield, Herkimer county; the fourth, Transactions, James P. Hitchcock, Truxton, Cortland county.

Dolph & Barber, Richmond, Ashtabula county, Ohio, exhibited 12 cheese, a sample from their "English dairy" for shipping to warm climates, which are very superior, and a diploma is awarded them.

This dairy comprises 800 cows, and the cheese is made by collecting the curd from many farms. Whether this mode of cheese-making affords any advantages over the ordinary method, is a question worthy of the careful consideration of the dairymen of New-York.

George A. Moore, of Buffalo, shipped a quantity of old cheese for exhibition at the Fair, but the same did not arrive. This is much to be regretted, as Mr. Moore, at the Buffalo Fair in 1848, presented some most excellent cheese from the Erie county dairies.

The judges report that the quantity of cheese exhibited was not as large as was expected, from the *great and increasing interest* of the dairy business in this country, as well as from the liberal premiums offered by the Society. The samples of cheese offered were generally of good quality and fine flavor.

Roswell D. Brown's statement.—Cheese made as follows: Milk set at 90 degrees heat, curdled with rennet sufficient for cutting in about 50 minutes; whey taken off, and worked fine with hands, then scalded by two applications hot whey, heat raised to from 100 to 108 degrees, and stood from 40 to 50 minutes; then work fine, remove hot whey and apply two pails cool whey to 100 lbs. curd; after having been well drained, work fine again, and apply one pound Hope Factory dairy salt to 40 pounds of pressed curd, well mixed before being put to press. Number of cows, 40. One cheese made 28th June, the other made July 30th.

P. Carter Lysander.—Rennet sufficient is used to curdle the milk in about 40 minutes, and put in according to the quantity of milk. The rennet was prepared as follows: 10 rennets put into a tub and four gallons of water added, with plenty of salt to keep them sweet, and strained before using; the milk set at 80 degrees, and scalded at 100 degrees; salt 3 pounds to 100 pounds of curd; use no cooling whey. Patent lever press used, and cheese in the press 24 hours; taken out, bandaged, greased and turned daily.

James P. Hitchcock, Truxton.—The milk is strained into a vat, and rennet added sufficient to curd the milk, and is left to stand for half an hour, when it is cut into squares of about half an inch; after standing twenty minutes, it is cut with a skimmer, commencing at the top and continuing until it is completed; the first cutting is perpendicular, the next in an opposite direction; a strainer is placed in one corner, pierced with fine holes to let off the whey; the curd is dipped into the middle of the vat, commencing about six inches from the sides of the vat, and about half an inch deep, taking up the curd carefully, and when all is removed from the sides, it is left to settle for full twenty minutes; the whey is then let out of the vat until it is *nearly* drained; if *entirely* so, it is injurious to the curd The same process as before of removing the curd from the sides is gone through with carefully until it is wheyed down; the curd is then cut into squares of six or eight inches, and whey heated 108 degrees is turned on so as to cover the curd; a board is then placed on the vat, and with a long knife cut the curd into half inch squares; the night's curd is then placed with it, which has been prepared substantially in the same manner; hot whey is then poured

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on to scald it sufficiently, and the whey is then drained off, and it is prepared for salting; one tea-cup full of salt to every eight pounds of cheese after it is taken from the press is used; the cheese is placed in the press for six hours, and it is then turned, and remains 24 hours, when it is removed to the shelves.

SUGAR.

8 *Entries.*

Judges.—Horace Davenport, Denmark; E. J. Smith, Delhi; Noah Hitchcock, Jr., Homer.

For best 25 lbs. of sugar, $10, awarded Peter Mitchell, Meredith, Delaware co.; second, $5, Charles W. Taylor, Homer, Cortland co.; third, $3, Luman Shepard, Skaneateles; fourth, Transactions, E. R. Dix, Vernon, Oneida co.

Statements of manufacture, Peter Mitchell, Meredith.

The sample exhibited was made as follows: The sap was gathered in pine pails and boiled in sheet iron pans, which were about four feet in length by two feet in width and three inches in depth, containing about four pails of twelve quarts each. The pans were set in a stone arch. Particular care was taken to gather the sap clean and keep it from all impurities. As fast as the liquid diminished in boiling, the pans were refilled with cold sap until it was boiled to the consistency of syrup or thin molasses. The quantity produced at each boiling was from three to five gallons. After thus boiling, the syrup was filtered through a piece of clean white flannel; it was then placed in tin pans to cool and settle in order to free it from any sediment that might remain. When sufficiently settled it was poured off, and about five gallons were put into a brass kettle together with one pint of skimmed milk and the white of four eggs. The whole was then boiled and skimmed until found (by cooling a small quantity in a spoon) to be properly or slightly grained. It was then taken from the fire and poured into pine tubs. The tubs were about the size and shape of a 14 pound sugar loaf and perforated with holes at the bottom for the liquid to drain off, and when sufficiently drained was put for use as is the sample exhibited.

Luman Shepard, Skaneateles.—Trees are tapped with an inch augur; and pine and cedar buckets are used to gather the sap, which is done as fast as it runs, and it is boiled immediately, for if left standing for any length of time, it undergoes a chemical change which materially changes the flavor of the sugar. I endeavor to keep my tubs sweet by scalding them thoroughly. I boil the sap in what I call an evaporator; it is made of three sheets of Russia iron—two sheets riveted together lengthwise, and one sheet riveted across the end; the sides are turned up about seven inches. Around the sides I have a wooden frame, with handles at each end to move it, when necessary. I set this on an arch; the fire passes only under the bottom, which prevents all danger from burning. It will boil from seventy to eighty pounds per day. The sap is boiled down to the consistency of thin molasses; it is left to settle, and then drained off, and strained through a thick cotton strainer; cleansed with milk and the white of eggs and saleratus—1 pint of milk, the white of 2 eggs, half teaspoonful of saleratus, to twenty pounds of sugar. It is then boiled and scummed over a slow fire, until, by taking

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up a little on a knife or spoon, it will string down like fine hairs, about one half an inch long; it is then hard enough for draining. It is then allowed to cool, stirring it occasionally to prevent it from becoming waxy—this gives it the grain—the more it is stirred, the finer the grain. When cold, it is put into a conical tub, about eighteen inches across the top, running to a point at the bottom; there is a hole in the bottom, to allow the molasses to drain out, and keep the top covered with a damp flannel cloth, which prevents the sugar from getting dry before it gets well drained. Then dissolve the sugar in water, and cleanse, boil, and drain it, as before, which, if it is well done, will have the appearance of loaf sugar. The taste of the sugar is materially changed by this double process of draining, giving it almost that of loaf sugar.

HONEY.

The premium, $5, awarded to Aaron Goodwin, of Brownville, Jefferson co., for a very superior sample of honey.

Thomas McClintock, of Waterloo, awarded a diploma for "Dugdale's moth-proof hive."

The Committee on bee hives have minutely examined Dugdale's moth-proof hive. They find it a very ingenious, simple, and commodious hive, embracing, in their judgment, in great perfection, these desirable requisites in a hive. The moth proof door, thoroughly ventilated by means of screen wire, and the moth chamber, so constructed that the moths can be taken, and, with their progeny, destroyed, are new and important appendages; and the hive, which is essentially a double one, is admirably constructed for the transfer of the bees from one hive to another, so as to preclude the necessity of swarming. They regard it, so far as their information extends, as the best hive extant; and commend it to the Society for the award which they deem such merit entitles it to.

HORACE DAVENPORT, *Chairman.*

SILK.

4 *Entries.*

Judges.—Seth Miller, Constableville; Roland S. Doty, Rome; Arphaxed Loomis, Little Falls.

For best reeled silk, premium awarded to N. M. Coburn, Stockbridge, Madison county, diploma and $5; second, $3, N. M. Coburn, Stockbridge, Madison county.

Best sowing silk, $3, Jefferey Hutchinson, River Head, Long Island; second, $5, Mrs. Parmelia Staats, Buffalo; third, Transactions, N. M. Coburn, Stockbridge.

The judges remark, that as only one parcel of manufactured silk was offered, and that only five yards, not being the quantity required, and of indifferent merit, no premium is recommended. Three specimens of reeled silk, two of which were very handsome, and of nearly equal merit. Four beautiful specimens of sewing silk were exhibited; all were even, firm, and in the highest degree creditable to the exhibitors. But one sample of cocoons offered, and that a fair specimen, but not of sufficient merit to warrant the premium offered by the Society, $5; but they recommend a volume of Transactions to the exhibitor, N. M. Coburn, Stockbridge.

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DOMESTIC MANUFACTURES. No. 1.

Entries. 23 blankets, 18 pieces of flannel, 4 pieces woolencloth, 13 pieces of carpeting, 11 pieces of rag carpeting, 8 hearth rugs.

Judges.—A. W. Brewster, Erie, Penn.; J. J. Barber, Homer; Wm. Slocum, Northampton, Fulton county.

The first premium, of $6, awarded G. W. Henry, Martinsburgh, for best woolen blankets; second, $4, Mrs. B. R. Voorhees, Amsterdam; third, $2, N. M. Coburn, Stockbridge; best 10 yards flannel, $6; G. W. Henry, Martinsburgh; second, $4, Chester Clark, Skaneateles; third, $2, C. Lawrence, Skaneateles; best ten yards woollen cloth, $10, W. Baker, Lima; second, $8, Mrs. B. R. Voorhees, Amsterdam; third, $3, S. W. Abbot, Kirkland; best 15 yards woollen carpet, $10, W. E. Tallman, Tully; second, $8, J. Conger, West Groton; third, $3, Samuel Goodell, Preble; best 15 yards rag carpet, $5, Mrs. A. A. Sweet, Pompey; second, $4, Caroline Tice, Webster; third, Transactions, Betsey Hoffman, Salina; best hearth rug, $5, E. Sheldon, Sennett; second, $4, Misses J. and M. Robb, Perth; third, $3, Mrs. J. M. Lathrop, Watervliet; fourth, $2, Mrs. H. Wier, Pittstown. A discretionary premium, $4, to Mrs. J. W. Collins, Smyrna, for second best pair Kersey blankets; and a diploma to Mrs. James T. Van Namee, Pittstown, for pair knit foot stools.

No. 2.—*Entries.* 10 double carpet coverlits, 9 pieces of kersey, from 10 to 26 yards each, 32 pairs woolen stockings, 27 pairs mittens and gloves.

Judges.—E. S. Salisbury, Belleville, Jefferson co.; Daniel S. Curtis, Canaan, Col.; Wm. Titus, Ira, Cayuga.

For best carpet coverlit, $5, awarded William Wright, Vernon; second, $4, L. T. Marshall, Vernon; third, $3, Wm. Wright, Vernon; fourth, $2, Mrs. H. Wier, Pittstown; fifth, Transactions, J. E. Didama, Perryville; best 10 yards kersey, $5, Mrs. W. J. Harroll, Pittstown; second, $4, to same; third, $2, Mrs. H. Wier, Pittstown; best pair knit stockings, $2, H. B. Lawton, Troy; second, Transactions, Horace Clark, Skaneateles; best pair wove stockings, $2, Mrs. J. B. Noyes, Clay; second, Transactions, Mrs. S. H. Church, Vernon; best woolen mittens, $2, F. C. Lawrence, Skaneateles; second, Transactions, Horace Clark, Skaneateles; best pair gloves, Mrs. J. B. Noyes, Clay, diploma; same to L. T. Marshall, Vernon, for ladies mittens, and same to Z. & W. Case, Gloversville, for one dozen very superior buckskin mittens.

No. 3.—*Entries.* 13 pieces, linen from 10 to 24 yards each, 7 pieces linen diaper, from 10 to 15 yards each, 3 pieces tow cloth, 30 pair cotton stockings, 10 pair linen stockings, 5 lbs. linen sewing thread, 4 stand cloths, 1 piece silk velvet, 20 runs woolen yarn, 26 skeins do, 1 linen seamless bag, 6 grain bags, 10 yards linen cheese strainer.)

Judges.—Amos Jones, Hopewell, Ontario; John J. Brinkerhoff, Owasco, Cayuga; Amos Wilcox, Danube, Herkimer.

Best 10 yards linen, $8, Mrs. W. J. Harroll, Pittstown; second $6, Clark Avery, Perryville; third $4, Nelson Van Ness, Mayville; best 10 yards diaper, $6, Horace Clark, Skaneateles; second, $4, Mrs. J. T. Van Namee, Pittstown; third, $2, Joshua Beard, Milo; best 15 yards tow cloth, $5, Mrs. Catherine McNight, Syracuse; second, Transactions, same; best cotton stockings, $2, W. Wright, Vernon;

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second, Transactions, Mrs. H. Wier, Pittstown; best linen stockings, $2, Mrs. Gorton G. Loomis, Westmoreland; second, Transactions, L. T. Marshall, Vernon; best linen thread, $2, Mrs. Catherine McKnight, Syracuse; second, Transactions, L. T. Marshall, Vernon; cotton stand cloths, $2, Hannah Earl, Granby; linen seamless bag, $1, Mrs. H. Wier, Pittstown; six grain bags, $1, Aaron Goodwin, Brownville; skein woolen yarn, $1, A. Howland, Stillwater; 10 yards linen cheese strainer, $2, S. W. Abbott, Kirkland; comforter, yarn and cruel, $1, Mrs. C. McKnight, Syracuse; stocking yarn, $1, Mrs. D. S. Severance, Truxton; 3 skeins woolen yarn, $1, J. C. Collins, West Turin; tent for show grounds, very superior, diploma, E. C. Williams, Rochester.

MANUFACTURES.

Judges.—O. V. Brainard, Watertown; A. Wager, Rhinebeck, M. E. Miller.

For a case of blue and black broadcloths, Utica Globe mills, a diploma; for three pieces black broadcloth, D. Kellogg, Skaneateles, diploma and silver medal; one box and two bales sheeting, Jones' Cotton mills Rochester, Seth C. Jones, diploma; mouselin de laines, Mrs. J. T. Van Namee, Pittstown, diploma; twenty-eight woolen shawls, very superior, D. Kellogg, Skaneateles, silver medal; four pieces fancy cassimeres, same, Transactions; three pieces, three ply carpets, very good, Schenectady steam mills, diploma. The judges would notice with pleasure the superior character of the aricles exhibited, doing great credit to our manufacturers, and only regret, that the exhibition had not been more extensive.

NEEDLE, SHELL AND WAX WORK.

225 Entries.

Judges.—Mrs. Harvey Baldwin, Syracuse; Mrs. LeRoy Mowry, Greenwich; Mrs. E. W. Leavenworth, Syracuse.

Best ornamental needle work, Miss Mary M. Chase, Chatham, Columbia co., diploma and $3.

Best ottoman cover, Mrs. T. M. Wood, Syracuse, diploma and $3.

Best group of flowers, Miss M. A. Van Voorhis, Lyons, Wayne co., diploma and $3.

Best variety of worsted work, Mrs. Rebecca Hewitt, Geneseo, Livingston co., diploma and $3.

Best fancy chair work with needle, two worked worsted chairs, Mrs. H. S. Lansing, Albany, diploma and $3.

Fancy chair work, Mrs. C. M. Burnet, Syracuse, diploma and $3.

Fancy armed chair, worked back and seat, 2nd premium, Jane McElroy, Albany, diploma and $2.

Best worked handkerchief, Mrs. H. R. Smith, Fredonia, Chautauque co., diploma and $3.

Best woolen shawl, Luman Shepherd, Skaneateles, diploma and $3.

2nd, Mrs. Aaron Goodwin, Brownville, Jefferson co., diploma and $2.

Best worked quilt, Miss Caroline Hammond, Skaneateles, diploma and $3.

Best white quilt, John F. Clarke, Onondaga, diploma and $3.

Best port folio, worked, Miss Emma Cheesboro, Syracuse, diploma and $3.

Best silk bonnet, Mrs. W. A. Cook, Syracuse, diploma and $3.

Best straw bonnet, Miss Mary Maybee, Syracuse, diploma and $3.

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Best lace capes, Miss Emeline P. Wagner, Fort Plain, Montgomery co,, diploma and $3.

Best lamp stand mat, Mrs. Sam'l Breese, Skenandoah, Oneida co., diploma and $3.

2nd, Miss A. Palmer, Stillwater, Saratoga co., diploma and $2.

Best shell work basket, Miss E. E. Baker, Lima, Livingston co., diploma and $2.

Best wax flowers, Miss M. A. Van Voorhis, Lyons, Wayne co., diploma and $3.

2nd. Miss Sarah C. Teller, Syracuse, diploma and $2.

Discretionary.

Nine pieces needlework, Miss Emily J. Pardee, Oswego, diploma and $3.

Fancy chair work, Mrs. A. Elmendorf, Palmyra, diploma.

Needlework, ladies skirt, Miss Mary Wynkoop, Syracuse, diploma.

Specimen of embroidery, port folio and picture, Miss Mary A. Fleming, Manlius, diploma and $3.

Piece needlework, imitation embroidery, Mrs. D. O. Kellogg, Troy, diploma.

Case of needlework, linen, Mrs. A. G. Dayan, Turin, Lewis co., diploma.

Black lace veil, Mrs. A. Howland, Stillwater, Transactions.

Pair of ottomans, Miss Mary Seymour, Syracuse, diploma.

Two ottoman covers, Mrs. John McCarthy, Syracuse, diploma.

Table spread and silk quilt, Mrs. O. S. Gillett, Fayetteville, diploma and $3.

Embroidery, Miss Sarah M. Burns, Canajoharie, diploma.

Worsted needlework, Miss Elizabeth Terry, Mt. Morris, Livingston co., diploma.

Ornamental needlework, Miss Elizabeth Dorr, Albany, diploma.

Embroidered rocking chair, Mr. A. Pruyne, Oswego, diploma.

Case fancy and domestic articles, Mrs. B. R. Voorhees, Amsterdam, diploma and $3.

Cambric handkerchiefs, Miss A. M. Hill, Canton, Onondaga co, diploma.

Bed quilt, Mrs. Royal Wilcox, Watertown, Jefferson co, diploma.

Worked curtains, Miss Emily P. Weed, Albany, diploma.

Bed spread, Mrs. Aaron Goodwin, Brownville, Jefferson co, diploma.

Counterpane, A. Bartlett, Syracuse, diploma.

Worked quilt, Mrs. Mary Gildersleive, Albany, (84 years of age,) diploma and $2.

White cotton bed quilt, Mrs. D. S. Severance, Truxton, Cortland co., diploma.

Table spread, Mrs. J. W. Hickox, Syracuse, diploma.

Calico quilt, Mrs. Jane M. Wright, Geneva, diploma.

Knit sash and shawl, Mrs. A. Goodwin, Brownville, diploma.

Cambric quilt, very fine, Mrs. Freeman Walker, Georgia, diploma.

Knit bed spread, Mrs. D. R. Holmes, Richland, Oswego, diploma.

Worsted needlework, Emmet Allen, Newark, Wayne co., diploma.

Portfolio worked, Miss Mary Murdock, Clarkson, Monroe co., diploma.

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Net lace cape, Miss Elizabeth Cook, Fort Plain, Montgomery co., diploma.

Moss lamp mat, Mrs. A. Palmer, Stillwater, Trans.

Dress coat, R. Titsworth, Syracuse, diploma.

Pair divans, Mrs. J. L. Greenman, Syracuse, diploma.

Knitted bed spread, coat, tidy, and two bead baskets, Miss Elizabeth Pexton, blind girl, Westmoreland, Oneida co, diploma and $3.

Three pairs slippers, purse, &c., Miss A. J. Kidder, Syracuse, diploma.

Case of flowers, Mrs. T. M. Wood, Syracuse, diploma.

Confectionary work, Wm. Ragg, Syracuse, diploma.

Needlework, Miss C. Huntley, Syracuse, diploma.

Lace veil, Miss S. Buel, Waterville, Oneida co., $1.

Fancy piece of embroidery, Miss M. Seymour, Syracuse, diploma.

Fire screen, Miss Sarah B. Gillet, Syracuse, diploma.

Chair back of needlework, Miss Mary W. Gillet, Syracuse, diploma.

One vase, one pyramid and two fine cushions of shell work, very elegantly wrought, Misses Sarah B. and Mary W. Gillett, Syracuse, silver medal.

Lot fine shirts, K. V. R. Lansingh, Albany, diploma.

Worked bird of Paradise, Mrs. A. L. Green Utica, diploma.

Gipsey telling fortune, needlework, very fine, Mrs. N. Clute, Louisville, Kentucky, diploma.

Two small cases wax flowers, S. B. Grey, Syracuse, diploma.

Two caps and one head dress, Mrs. W. A. Cook, Syracuse, diploma.

Three caps, Miss Mary Maybee, Syracuse, Trans.

Pair worked worsted suspenders, Miss Amelia Wallace, Syracuse, diploma.

Six pieces threadlace, Misses Sarah Ann and Lavina Beverstock, Ogdensburgh, St. Lawrence co., diploma.

Gentlemen's dressing-gown, Mrs. J. S. Davis, Syracuse, diploma.

Coat, vest and pantaloons, Thomas Cooke, Jr., Albany, diploma and $3.00.

Four crochet collars, N. M. Beacham, Jr., Skaneateles, diploma.

Horn of plenty, worsted work, Mrs. A. W. Bruce, Sullivan, Madison co., diploma and Trans.

Lace manufactured by Sarah Ann Alderman, Canastota, diploma and $2.00.

Embroidered sofa pillow, Mrs. A. Pruyne, Oswego, Trans.

FLOWERS.

Judges.—Alexander Thompson, M. D., Aurora; John Stryker, Rome; David Thomas, Aurora.

The following are the premiums awarded:

PROFESSIONAL LIST.

To James Wilson, Albany, for the greatest variety and quantity of flowers, $5; to James Wilson, for the greatest variety of Dahlias, $5; to Mr. W. Newcomb, Pittstown, for best 24 dissimilar flowers, $3; to Ellwanger & Barry, Rochester, for the greatest variety of Roses, $5; to James Wilson, for the best 24 dissimilar blooms, $3; Ellwanger & Barry, for the best 10 varieties of Phlox, $3; to James Wilson, for the

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best seedling Phlox, $2; to James Wilson, for the greatest variety of Verbenas, $3; to Ellwanger & Barry, for the 12 best varieties of Verbenas, $2; to James Wilson, for the best seedling Verbena, $2; to Mr. W. Newcomb, for the best collection of German Asters, $3; Ellwanger & Barry, for the best and greatest variety of Pansies, $3.

AMATEUR LIST.

To Mrs. E. T. T. Martin, Willow brook, for the greatest variety and quantity of flowers, Silver Medal; to M. Wells, Jamaica, for the greatest variety of Dahlias, Silver Medal; to Mrs. W. Newcomb, Pittstown, for the best 12 dissimilar blooms of Dahlias, $3; to Mrs. E. B. Morgan, Aurora, for the greatest variety of Roses, Silver Medal; to Mrs. David Thomas, Greatfield, for the best 12 dissimilar bloom Roses, $3; to Mrs. E. T. T. Martin, for the best 6 varieties Phloxes, $3; to Mrs. E. T. T. Martin, for the greatest variety of Verbenas, $3; to Mrs. Professor Jackson, Schenectady, for the best seedling Verbena, $2; to Miss L. J. Whitney, Rochester, for the best 12 varieties of Verbenas, $2; to Alphonse Le Coteux, Buffalo, for the best collection of German Asters, $3; to Alexander Thompson, Aurora, for the best and greatest variety of Pansies, $3; to Dr. Herman Wendell, Albany, for the best 12 varieties, $2.

GENERAL LIST, OPEN TO ALL COMPETITORS.

To Ellwanger and Barry, for the best collection of green house plants, silver medal; to Mrs. C. B. Sedgwick, Syracuse, for the best floral design, silver medal; to Mrs. W. Newcomb, for the second best floral design, $3; to Professor Jackson, for the best floral ornament, silver medal; to Mrs. E. T. T. Martin, for the second best floral ornament, $3; to James Wilson, for the best hand bouquet flat, $3; to Dr. Herman Wendell, for the second best hand bouquet flat, $2; to James Wilson, for the best hand bouquet, round, $3; to Mrs. White, for the second best hand bouquet round, $2; to Alexander Thompson, for the best basket bouquet, with handle, $3; to M. Tillman, gardener for Dr. Herman Wendell, for the most beautifully arranged basket of flowers, diploma; to Aurora Horticultural Society, for the best exhibition, Hoveys' colored fruits.

The following were among the contributors to the floral exhibition:

By Miss C. B. Sedgwick of Syracuse, a collection of roses tastefully arranged in a basket of moss. A rustic vase of elegant proportions on a stand of moss, containing a large collection of grasses, arranged in a beautiful bouquet.

By Mrs. White of Syracuse, a superb round hand bouquet containing many rare exotics.

By Miss L. J. Whitney of Rochester, 4 very beautifully arranged baskets of cut flowers, together with a collection of cut flowers from the green house; also a superb collection of Verbenas, in a fine state of preservation, consisting of 25 varieties.

By Mrs. E. B. Morgan, of Aurora, 2 flat hand bouquets, 2 do. parlor bouquets, 15 varieties of roses, viz: Champney, Amie-vibert, Fellenberg, Princess Maria, Indica, Blush China, Agripena, Dubourg, Hermosa, Jacksonia, Sanguinea, Fragrans, Bellona, Bougere. Several varieties of Verbenas, Scabiosa caucasea, Rudbeckia splendens, Liatris scabiosa, Lathyrus latifolius, Digitalis ferruginea, Dianthus caryophyllus.

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By Mrs. E. T. T. Martin of Willowbrook, near Auburn, two large and elegantly formed flat bouquets, containing a great variety of Verbenas; one bouquet of seedling Verbenas, raised at Willowbrook by Mrs. Martin. A superb bouquet from the conservatory of Mrs. Martin, composed of Souvenir de la Malmaison, Champney, Cluster and Lamarque Roses; 3 varieties of Fuchsias, Cobea scandens, Abutilon striata, 4 varieties of Carnations, Brompton stocks, Verbenas, Heliotropes, Calceolarias, &c.; One large table bouquet of miscellaneous flowers, together with a large collection of choice Dahlias, very tastefully arranged in a magnificent bouquet.

By Mr. Paris Barber of Homer, assisted by Mrs. Walworth and Mrs. Martin of Homer, devised and arranged a magnificent cornucopia, overflowing with an abundance of rich fruits and choice flowers.

By Dr. Herman Wendell of Albany, an exquisitely moulded moss basket, filled with a fine collection of verbenas, pansies, perpetual roses, &c., beautifully arranged by his gardener, M. Tillman. Also a choice collection of Verbenas and Phloxes, in varieties.

By H. Wells of Jamaica, a very extensive and fine collection of dahlias.

By Alphonse Le Coteux of Buffalo, a superb collection of German Marguerites. The attention of the committee was particularly directed to these fine flowers as being greatly superior to those exhibited at any previous fair.

By David Thomas, of Aurora. Statice latifolia, Chinese barberry, Campanula pyrimidalia, Campanula rotundifolia, Liatris scariosa, Breck's seedling Phlox, Phlox alba, Phlox Drummondii, Funkia japonica, Colchicum autumnalea, Centaurea montanæ, Colchicum variegatum, Gilia coronopopolia, Lychnis, double crimson, Ampelopsis decumbens, Euonymus odoratis, Euonymus angustifolia, Gaura biennis, Gaura marginata, Funkia lancaifolia, Double Sunflowers, Cyclamen hederafolia, Cyclamen persicum, Cynirarea scolymus, Tamarix gallica, Liatris (from Illinois,) Tagetes erecta, Tagetes patula, Hibiscus incanus; Roses, Agrippina. Archduc Charles, Sanguinea, Odorata, Tea scented, Madam Desprez, Jacksonia or Hundred-leaved.

By Professor Jackson, of Union College. A splendid floral design worked in mosaic, from a great variety of seedling verbenas raised in the garden of Professor Jackson and presented by Mrs. Jackson.

By Mr. Chedell, of Auburn. Dahlias in varieties, Hibiscus syriacus, Balsomines, several fine varieties of Verbenas, American Centaurea, Clematis virginica, Chrysanthemums, Z inia violacea, Z. elegans.

By Alexander Thompson, of Aurora. One basket bouquet of choice flowers as Heliotropiums, Cyclamens, Abutilons, German Asters, Verbenas, Pansies, together with a collection of miscellaneous flowers, embracing several fine varieties of Pansies and Verbenas, &c.

By James Wilson of Albany. 24 varieties of Roses, Dr. Roques, Mrs. Cripps, Prince Albert, Marquis Bocella, Prince of Wales, Madam Dampier, Cels, Ophirie, Ninon de L'Enclos, Bourbon Queen, Noisette Luxemburgh, Lutescens mutabilis, Madam Nerard, Giante de Battailles, Acidell, Crimson Globe, Emily Courtier, Phœnix, Madam Bosanquet, Triumph de Luxemburgh, Eugene Jovine, Agrippina, Augustine Seleur. 24 *Dahlias*—Striata, Marquis of Aylsbury, Orlando, Great Western, Mrs. Rushton, Mrs. Vyse, Toison d'Or, La Belle Blond, Antagonist, Princess Radzville, Cheltenham Queen, Miss Percival, Lady of the

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Lake, Minerva, Lady Ann Murray, Caleb Cope, Yellow Perfection, Great Mogul, Golden Rule, Tippecanoe, Lady St. Maur, Constantia, Star, La Tour d'Auvergne, Viscount Ressegneur, McKenzies Perfection. 8 Seedling Phloxes, 12 Seedling Verbenas, 33 varieties of Verbenas, a very superior collection of German Asters, Phloxes, Balsams, Petunias, Coxcombs, &c. 1 flat floral ornament, 1 round do. composed of miscellaneous flowers, and both very splendid, 2 round hand bouquets, 2 do. flat most beautifully and tastefully made up of Hoya carnosa, China Roses, Abutilons, Ericas, Fuchsias, Cyclamen, Calceolarias, and other choice exotics.

Ellwanger & Barry, Mount Hope Nurseries, Rochester. *Roses—Hybrid Perpetuals*, Duchess de Nemours, Edward Jesse, Marquis Boccella, Augustine Mouchelet, Lady Fordwick, Rivers, Prince de la Guillotiere, La Reine, Yolande d'Arragon, Joasine Hanet, Antigone, Prudence Kaeser, Montaigne, Madam Laffay, Marshal Soult, Sydonie, Blush 4 seasons.—17 varieties. *Tea Roses*—Bougere, Smithii, Purpurea, Belle Amelia, Duchess de Normandie, Victoire Modeste, Bourbon, Marquise d'Ivry, Hermosa, Phœnix, Cytherii, Madam Ersant, Bouton de Flore, La Gracieuse.—16. *Chinese or Bengal*—Louis Philippe, Cels, Sanguinea, Duchesse of Kent.—4. *Noisette*—Fellemberg. *Phloxes*—Anais Chauveire, Blanche de Neuilly, Norfolkii, Accuminata, Accuminata Alba, Reine Louise, Auguste, Candidissima Nova, Striata purpurea, Eclypse, Speciosa, Ulysse, Nymph alba, Goethe, Oiel de Lynx, Breckii, Robert de Flanders, Paniculata nova, Arsina, Pottsii Insignis, Alba glomerata, Grato, Picta, Invincible, Fleur de Marie, Reine de Jour, Kermesina, Frelinghuysen, Macrantha, Speciosa, Lilalicina grandiflora, Lawrencia, Breckii, Decapata, New purple panicled. *Evergreens*—Abies excelsa, Abies spectabilis, Abies morenda, Abies Douglassii. Abies webiana, Pinus calabrica, Pinus excelsa, Cedar of Lebanon, Juniperus Echinoformis, Auracaria imbricata, Silver striped euonymus, Gold striped euonymus, Cupressus sempervirens, Cupressus pendula, Deodar cedar, Chinese Juniper, Irish yew, Cryptomeria japonica, Taxodium sempervirens, Evergreen oaks; 20 varieties.

By Wm. Newcomb, Pittstown, a splendid collection of German Asters, particularly some splendid varieties arranged on beds of moss, in a state of perfect formation; also a very fine display of Dahlias, together with an extensive collection of miscellaneous plants. *Dahlias*—Hero of Stonehenge, Baron, Great Mogul, Isis, Princess Radzville, Constantia, Cleopatra, Capt. Warner, Tamerlane, Eveque De Bayeux, Antagonist, Robert Burns, Athlete, Golden Souvenir, Fulwood Scarlet, Victory of Sussex, Marchioness of Cornwall, Duke of York, Maid of Bath, Unique, Royal Lilac, La Tour D'Auvergne, Essex Primrose, Punctata Formosa, Lady St. Maur, Queen, (Widnal's) Oddity, Beauty of Plymouth, Mary, (Ward's) Arethusa, Indian Queen, Grandis, Lady Featherstone, Queen Mary, Lutea grandiflora, Striata formosissima, Mrs. Rushton, Andrew Hofer, Blandina, Admiral Stopford, Marshall Soult, Hero of Tippecanoe; 3 varieties of seedlings. *Cut Flowers.*—Zinia elegans, dwarf Asters, Phlox drummondii, Tree Mignionette, Sweet Mignionette, Golden Eternal-flower, White Eternal-flower, Lady of the Lake, Delphinum, Delphinum Bee, (branching varieties) Gilia capitata, Tagetes, (French) Tagetes in varieties, White Globe Amaranth, Scarlet Globe Amaranth, Helianthus, (perennial) Gladiolus psittacinus, Verbenas in varieties, White Scabious, Purple Scabious, Roses, (Aubernon) Turkey and China Asters, White and Purple Sultan, Galliarda picta.

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The committee take great pleasure in observing the progressive advancement which is very evidently taking place in the horticultural department of the society, manifesting itself in the very beautiful display of fruits and flowers, greatly superior in quality and scarcely exceeded in quantity by any previous exhibition, notwithstanding the protracted and excessive drought, and the otherwise unfavorable condition of the fruit season.

The widely extended influence which this department is exerting on the horticulture of the State, warrants the committee in suggesting to the Society that its power of giving efficient aid and encouragement to further effort may be greatly extended by a judicious and discriminating expansion of the premium list, by increasing the number and value of the premiums.

FRUIT.

Apples and Pears.

Judges.—F. R. Elliott, Cleveland, Ohio; Charles Downing, Newburgh; H. G. Dickerson, Lyons.

The committee appointed to adjudge and report as per instructions of the Society, beg leave to offer the following: In examining the collections of fruits and awarding premiums, they have been guided by good qualities and characters of fruits, rather than by external appearance of specimens; and they trust that the course adopted, to award premiums only to the best varieties, together with the enumerating of those varieties, may prove of benefit to the reader of this report who is desirous of collecting information respecting such varieties as are best adapted to general cultivation.

It must not be inferred from this that we have named all the best varieties for cultivation, or that indeed we have named even the 12 very best varieties, but have selected from the collections of exhibitors the 12 varieties named below, as being varieties proved to rank above second rate.

In awarding the premiums for the greatest and best variety of good table apples, the committee present the collection of Col. Benj. Hodge, of Buffalo, as entitled to the first premium—diploma and Hovey's Colored Fruits.

The collection of Abner Bryant & Son, of Buffalo, as entitled to the second premium—$5.

The third premium not awarded.

The award for the best 12 varieties of table apples, we find due to the following, viz: Northern Spy, Westfield Seek-no-further, Early Joe, Baldwin, Roxbury Russet, Large Early Bough, Swaar, Fall Pippin, Esopus Spitzenburgh, Lady Apple, Jersey Sweeting, Jonathan, and Rhode Island Greening, which alone being in the collection of Col. B. Hodge, entitle him to the first premium—$5.

The second premium on the same, we award to A. Bryant of Buffalo, Trans. and $2.

The award of the 1st premium, $3, for the best six winter varieties, we judge due to Col. B. Hodge, as comprising in his collection six winter varieties of apples, that prove suited to general cultivation.

The second on the same, we give to A. Bryant, & son, Trans. and $2.

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The premiums offered for fall seedling apples, we cannot award; no specimens being shown that will rank in quality, with varieties already shown and described, and the rules of Pomology, adopted by the Society, debar us from awarding any premiums, unless the seedling shall be in some respects, superior to a variety already known and described.

The first premium, diploma and Hovey's colored fruits, for the greatest number of varieties of good pears, named and labelled, we award to John Morse, of Cayuga bridge, whose specimens were well grown, and generally of the very best varieties.

The second, $5, B. Hodge, of Buffalo.

The third, Trans. to J. W. P. Allen, of Oswego.

The first premium, diploma and $5, for the best collection of first rate Autumn pears, we award to John Morse. in whose collection we find the following varieties deserving general culture. White Doyenne, Steven's Genesee, Buerre Bosc, Bartlett, Ganselle Bergamotte, Swan's Orange, Louise Bonne de Jersey, Doyenne Gris, Seckel, Washington.

The second premium, Trans. and $2, on the same, we award to J. W. P. Allen, of Oswego.

The premiums offered on winter pears, we do not award, there not being such a collection of varieties on exhibition, as we deemed worthy of report.

The premium, diploma and Hovey's colored fruits, for the best collection of newly introduced pears, with a description, we award to Dr. Herman Wendell, of Albany. Jalousie de Fontenay, Vendee, Williams Bonchretien, Seckel, Duchesse d'Angouleme, Beurre de Capiaumont, Gansells Bergamotte, Inconnue Van Mons, Beurre Gris d'Hiver Nouveau, Beurre Diel, Flemish Beauty, Glout Morceau, Beurre d'Amaulis, Compte de Lamy, Doyenne Musque, Beurre Goubalt, White Doyenne, St. Ghislain.

The above would comprise the duties of this committee as per instructions, but we cannot avoid a wish to notice various contributions, as creditable to exhibitors; yet owing to the unfavorable season for fruits, many who usually have grown and exhibited large numbers of varieties, conld this year only present a very limited number. Several gentlemen, in fact, who are known to your committee as having in former seasons contributed largely, could this year present not sufficient number of varieties to compete for premiums.

Messrs. Ellwanger and Barry exhibited some very fine specimens of pears and apples, evidencing skill in the culture.

Mr. Job Whipple, of Union Springs, Washington county, presented a seedling apple, under name of "Washington strawberry," which, although not worthy of cultivation, according to pomological rules, is yet a showy appearing fruit, and may prove desirable for market culture.

Mr. E. Hamlin, Clay, exhibited a collection of pears and apples, many of them fine.

Mr. J. W. Whitney, of Rochester, had some fine specimens of Seckels and white Doyennes on the shelves.

Messrs. Charles Downing, of Newburgh, and W. G. Verplanck exhibited fruits of the Osage orange, a curiosity to many persons, who had never before seen the fruit, and of considerable interest at this time, as the plant or tree promises to be of great value in many sections of our country for hedges.

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Mr. W. G. Verplanck, Geneva, exhibited one dozen of Bartlett pears that were so finely grown, your committee cannot avoid a special notice of them, and would advise a copy of Transactions be awarded for the same.

Mr. S. Worden, of Oswego, presented several dishes of fine pears and apples, among them some very beautiful specimens of Dearborn seedling pears, and a fine seedling apple, much resembling the Porter.

Mr. J. E. Bloomfield, Mexico, placed upon the shelves some fine pears and apples.

Mr. Lewis Eaton, of Buffalo, had a large collection of apples and pears; but unfortunately for Mr. E., in the matter of premiums, they did not comprise those varieties deemed best to name for general culture.

Lewis F. Allen's Esq., collection comprised some valuable varit ies of apples and pears, well grown.

E. R. Dix, Vernon, and G. W. I. Brownson, Amsterdam, were also contributors of pears and apples.

PEACHES AND PLUMS.

Judges.—James Dougall, Amherstburgh, C. W.; H. H. Coit, Euclid, Ohio; Calvert Comstock, Rome.

Peaches.

Best twelve varieties, John Morse, Cay. Bridge, diploma and $5.
2nd, James M. Whitney, Rochester, $2.
Best six varieties, Ellwanger & Barry, Rochester, $3.
2nd, H. G. Dickinson, Lyons, Wayne co., $2.
Best twelve peaches, B. R. Norton, Syracuse, (Crawford's early,) $2.
2nd, Abram Vail, Waterloo, Seneca co., Trans.

Plums.

Best collection, thirty-one varieties, Dr. Herman Wendell, Albany, diploma and $5.
2nd, fifty varieties, Isaac Dennison, Albany, $3.
Best six varieties, Ellwanger & Barry, Rochester, $3.
2nd, C. S. Wilson, Utica, $2.
Best twelve plums, choice varieties, R. Woolworth, Syracuse, $2.
2nd, H. H. Dickinson, Lyons, Transactions,

Nectarines.

Best and greatest number, John C. Hastings. Clinton, Oneida $3.

The judges remark—that the exhibition of these fruits was very extensive and fine, so much so that considerable difficulty was experienced in awarding several of the premiums.

Of plums there were several very large collections, and your committee cannot refrain from particularising the following, even at the risk of being considered invidious, viz: Dr. Herman Wendell's and Mr. Isaac Dennison's, of Albany, and Messrs. Ellwanger & Barry's, of Rochester, which were of fine and rare varieties, Mr. Dennison's being composed principally of his own seedlings, many of which are amongst the best standard varieties now in cultivation.

Only one lot of nectarines exhibited, but those remarkably fine, and worthy of the premium awarded. This was the Elruge variety of nectarine, by J. C. Hastings, Clinton, Oneida co.

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GRAPES AND MELONS.

Judges.—Samuel Miller, Rochester; Jacob M. Schermerhorn, A. B. Atkyns.

For the best and most extensive collection of good native grapes grown in open air, to J. C. Hastings, of Clinton, Oneida co., $5.

For second best collection of good native grapes grown in open air, to Dr. Daniel Ayres, of Amsterdam, Montgomery co., $2.

For the best three varieties of native or foreign grapes grown under glass, to W. R. Coppock, of Buffalo, $5.

For second best three varieties of native or foreign grapes grown under glass to J. C. Hastings, of Clinton, Oneida co., $2.

For the best dish of native grapes (Isabella,) to Rufus Cossett, of Onondaga, vol. Transactions.

For the best grown and matured specimens exhibited, two varieties only, (Muscat and Black Hamburgh,) to Grove Lawrence, Syracuse, Downing and Fruit Cult.

For three specimens of grapes, to Joseph E. Bloomfield, of Mexico, Oswego co., Fruit Cult.

For two specimens of champagne wine, to B. Poppe, of Syracuse, Downing and Trans.

For a specimen of port wine from a native grape, to Charles A. Peabody, Esq., of Columbus, Geo., diploma.

For the best 6 specimens of watermelons, to L. B. Langworthy, Esq., of Rochester, $3.

For the best 6 specimens of muskmelons, to Lyman B. Langworthy, Esq., Rochester, $3.

Quinces.

The best, Ellwanger & Barry, Rochester, $3.

The second, $2, Lewis Eaton, Buffalo.

The judges report, that progressive improvement has been noted by them in the culture of the grape at the several annual meetings of this Society last past. Fine specimens were exhibited this year, both of native and foreign grapes, grown in the open air and under glass in cold vineries, by Hon. Grove Lawrence of Syracuse; W. R. Coppock, of Buffalo; Dr. Ayres, of Amsterdam, Montgomery county; Rufus Cossett, Esq., of Onondaga, and J. C. Hastings, Esq., of Clinton, Oneida county.

Mr. Hastings, of Clinton, exhibited three varieties of foreign grapes well matured by out-door culture: also, three varieties matured in a cold vinery; also a seedling matured under glass, grown from a seed of the White Madeira. The vine is five years old. The fruit much resembles the White Sweetwater. It is a sweet and juicy grape, though not *high* flavored. We could not learn from the grower whether this vine was likely to prove more hardy than the vine from which it was grown. The Chasselas grapes exhibited by this gentleman were as fine as we ever saw.

W. R. Coppock, of Buffalo, exhibited five varieties of grapes grown under glass, in a cold vinery: all of them beautiful in the size of their clusters, and most of them well matured. They clearly exhibited the fruits of scientific cultivation. From Mr. Coppock's experiments and success in the most important fields of horticulture, still more valuable results are anticipated.

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Dr. Daniel Ayres, of Amsterdam, exhibited three varieties of grapes, (the Alexander, Catawba and Isabella,) well grown and quite well matured, considering that this season is universally declared throughout the State to be, in consequence of the drougth, among other causes, two or three weeks later than usual. These grapes were grown without artificial heat or protection. Dr. Ayres is truly successful in grape growing.

Rufus Cossett, Esq., of Onondaga, exhibited two varieties, the Isabella and Sweet-water. One cluster of his Isabella was pronounced the most splendid specimen ever seen by the committee of this excellent grape, and showed the results that may be confidently expected from the careful culture of this prolific, hardy grape.

W. R. Wheeler, of Camillus, exhibited four varieties of native grapes, but owing to the backwardness of the season, they were not well matured.

Hon. Grove Lawrence, of Syracuse, exhibited the finest specimens we have seen grown in this State, of the White Muscat and Black Hamburgh grapes. The following is the mode of culture as given by Judge L. "The grapes were raised in the open air, since the month of April; during the winter the vines were under glass, though no artificial heat has been applied either during winter or summer. The ground where they grew, to all appearance, froze as hard in winter as in the open air. Both of these varieties have been fully ripe since the middle of July last, and they will continue fresh upon the vine till late in October."

Joseph E. Bloomfield, of Mexico, Oswego co., exhibited specimens of the Sweet-water, Miller's Burgundy, and Isabella grapes, exhibiting the present state of their maturity in lat 43° 48′ and three and a half miles from lake Ontario.

Native Wines.

B. Poppe, of Syracuse, exhibited a specimen of new grape juice, or *must*, for wine, which he calls a champagne; the one made from a mature white grape and the other from a ripe grape of a dark color. The latter was thought to promise well. We understand the maker is a German, and is attempting to apply German vine-dressing and vintage to the soil and climate of the centre of our State. May he have abundant success. The manner of culture by Mr. Poppe, is annexed to this report.

Charles A. Peabody, Esq., of Columbus, Georgia, exhibited to us a specimen of "port wine," as he terms it, manufactured from the fruit a vine (a native of Georgia) which attracted the curiosity and interest of your committee. We summoned to our aid some of the most experienced gentlemen congregated at the State Fair, and all, without exception, pronounced it a most valuable wine; promising, in the opinion of most of them, to rival the celebrated wines of Oporto, known as "Port," in some if not all of its most valued properties. The following minute of the wine and the mode of its manufacture, was handed to our chairman. by his request, from the manufacturer:

This wine is made from a native grape, found in the vicinity of Columbus, Georgia. No spirits of any kind, or coloring matter is put to it. One pound of New Orleans sugar is put to a gallon of the juice, and in all other respects it is as pure as when it first flowed from the press. It is found to keep well, and improve with age. This bottle is

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of the vintage of 1847. I made last year some 200 gallons, and but for the great frost this year in April, which killed all the fruit and many of the vines, I should have made 1,000 gallons. The grape from which this wine is made, is unfit for the table, and has a puckery astringent taste, which induced me to try if it would make Port wine.

Melons.

The variety of melons on exhibition was not large, and the only ones which proved of a good quality in the eating, were from the grounds of H. N. Langworthy, near Rochester. The enormously large water melons exhibited by E. P. Prentice, of Mt. Hope, near Albany, were of the old, long, marble-skinned variety. They were remarkable for their size; but the one tasted by the committee, though fully matured, was not fine flavored. The White Imperial, or Victoria, and the black Spanish water melons, are so much superior to the old varieties, that they have nearly superseded them among amateurs, and yet these varieties are so inclined to *sport*, that it is very difficult to keep the varities pure, or to get pure seed for cultivating them.

B. Poppe's statement.

B. P. Johnson, Esq.,
Sec. N. Y. State Ag. Soc., Albany.

Sir—I beg to submit the following statement of my management of vinery, &c. The vinery is located at Syracuse near the Fair grounds; it is on a hill side, with a southern exposure. The soil loamy on the surface, with a subsoil of red clay, which loosens by exposure to the air. The ground was covered with stumps and brushwood when I entered upon it 6 years ago. I hoed it over thoroughly, so as to entirely reverse the soil to the depth of about two feet, using the roots and stones as a fence. I manured it over in the 2d and 3rd years. The grape roots were all imported from Baden-Baden, 20,000 in number; 15,000 of them I planted out, digging the holes about 4 feet apart, about 18 inches deep, and setting in the roots aslant about 6 inches towards the south, and so as that the top lays upon the ground towards the north, but not enough to expose any part of the plant. I arrange it so as to have the plant settle from sight, and mark the spot with a stick. The other 5,000 plants I reserved to supply failures of those planted out. Over 4,000 of them failed, in consequence of shipment from Europe too late in the season; but this difficulty I have obviated by successful operations with slips.

I have cut slips 4 or 5 feet long and prepared a trench about 18 inches deep and lay in the slip bending it up even with the surface and marking the spot with a stick. Plants raised from slips so prepared have borne grapes the second year in some cases, and always in the 3d year by cutting back so as to leave the first year 2 buds, and the second year 4. Very short plants I allow 6 buds. In the fourth year 12 buds, and in the 5th year as many as thirty buds may be left. The ground should be worked every spring about 6 inches deep. For raising grapes the plants should be 8 feet apart, and this would allow a plow to pass and be cheaper than hoeing. Any vegetable may be raised between them that does not grow high enough to obstruct the sun. The refuse from vegetables well rotted with cow dung is the best manure. Horse or hog manure is injurious, as it creates a kind of excrescence to grow upon

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the stems, and otherwise hinders the growth, and indeed often destroys the plant.

In the spring, after flowering time, some of the underneath foliage should be removed to allow a free passage of air to the berry, otherwise they do not develope themselves fully, and many shrivel up and are lost.

Mildew is the only foe I have encountered, and this may be conquered by arranging the land so as to prevent dust settling on the grape, which is the cause of mildew, as it holds the moisture of dews or rain about the grape, which would not be the case if the grapes were clean. Hoeing should therefore be avoided during the summer, as it loosens the earth and raises dust.

The grapes should not lay on the ground, neither should they be raised more than 4 feet above it. Trimming should be done every season in March; late trimming causes bleeding and consequent loss of thrift.

MAKING WINE.

The grapes must be gathered when fully ripe at the end of October or beginning of November—the frost will never hurt the ripe grape—throw the grapes into a large tub, and pound them so as to break the grape; let it stand 3 days for red wine—(for white wine from black or blue grapes must not stand)—then press the liquor from the seed and skins in a common press, keeping out the skins and seeds; put it into a hogshead filled within 3 inches, and make around the bung-hole at about an inch and a half from it a rim of clay 4 inches high, into which fermentation will throw the impurities; let it stand a week, and then remove the clay and place over the bung-hole a sand-bag valve for a few days until the fermentation subsides, after which bung it up, leaving a small vent by means of a goose quill near the bung; after 2 or 3 days close it tight and let it stand till February, and on a clear day rack off in small barrels; these barrels will require to be kept in a cool cellar and filled up once a month, the volume being constantly diminishing, and the vacant space would cause the whole to sour. All the vessels used should be very clean, and no metal should be brought into contact with the wine in any part of its manufacture.

The following are the grapes cultivated by me:

Black.—Burgundy, Silvaner, Black Cluster, Champagne.

Red.—Feldliner, Muscat, Malvider, Faktor, Rolander.

Blue.—Faktor, Hungarian.

White.—Netherlander, White Cluster, Elsesser, and many others.

Syracuse, September 12, 1849.

FOREIGN FRUITS.

Judges.—Dr. Herman Wendell, David Thomas, B. Hodge.

The committee on Fruits, the production of growers of sister States and the Canadas, beg leave to report, that the excessive drought which has prevailed throughout nearly all of the Middle, Western, and Eastern States, has prevented as extensive an exhibition as we should have had under other circumstances, but, notwithstanding, the collections which have been exhibited, are unusually rich in varieties recently introduced to the attention of the pomological community; and are, therefore, at

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the present time, when Pomology is exciting so much public attention, of great interest. The committee cannot but thank the several gentlemen exhibitors, in the name of the Society, for the rich display, which has proved of so much interest to visiters at the Fair.

There were exhibited by J. A. Kennicott, M. D., of Grove, Lake county, Illinois, twenty-six varieties of apples.

By F. R. Elliott, of Cleveland, Ohio, twenty-nine varieties of apples, and thirty-seven varieties of pears.

By James Dougall, of Amherstburgh, Canada West, thirty-five varieties of apples, fifteen varieties of pears, and eight varieties of grapes.

By E. Harkness, of Peoria, Illinois, sixty-one varieties of apples.

By J. Gallup, of Cleveland, Ohio, nine varieties of apples.

By Mr. Overman, of Canton, Illinois, thirty varieties of apples, and three varieties of pears.

Premiums.

The premiums have been awarded as follows:

On Apples.

For the best exhibition of apples, to E. Harkness, of Peoria, Illinois, a diploma and a volume of Transactions.

For the second best exhibition of apples, to James Dougall, of Amherstburgh, Canada West, Thomas' new edition of Fruits.

On Pears

For the best exhibition, to F. R. Elliott, of Cleveland, Ohio, a diploma and volume of Transactions.

For the second best exhibition, to James Dougall, of Amherstburgh, Canada West, Thomas' new edition of Fruits.

On Grapes.

For the best exhibition, to James Dougall, of Amherstburgh, Canada West, a diploma and a volume of Transactions; and to J. A. Kennicott, for a fine exhibition of western apples, a volume of Downing's Fruits. To Mr. Overman, of Canton, Illinois, for a fine display of apples, a volume of Downing; and for an exhibition of pears, a volume of Thomas' Fruits. To F. R. Elliott, of Cleveland, for a rich display of new western apples, a volume of Thomas' new edition of Fruits. To J. Gallup, of Cleveland, a volume of Downings' Fruits. J. C. Holmes, Detroit, for apples, American Culturist.

A full list for all the varieties exhibited is herewith submitted.

FOREIGN FRUITS.

There was exhibited by Jas. Dougall of Amherstburgh, Canada West, thirty-five varieties of apples, viz: Green Newtown Pippin, Alexander, Fameuse, Bourassa, Goygean, Rosseau, Yellow Bellefleur, Drap D'Or, Rhode Island Greening, Pomme Gris, Braddocks Nonpariel, Golden Pippin, Bullocks Pippin, White Bellefleur, Dominie, Wendover Montreal Winter Calville, Summer Queen, Hawthornden, American Summer Pearmain, Keswick Codlin, King of Pippins, Jersey Sweeting,

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Golden Nonpariel, Beauty of Kent, Summer Sweet Paradise, Green Seek no further, Baldwin, Mela di Carlo, English Nonpariel, and Ribston Pippin; Fifteen varieties of Pears, viz: Williams Boncretien, Passe Colmar, Napoleon, Summer Boncretien, Easter Beurre, White Doyenne, Compte de Lamy, De Louvain, Duchesse De Mars, Thompsons, St. Germain, Dunmore, Seckel, Croft Castle, Autumn Bergamot; and eight varieties of grapes, viz: Catawba, Clinton, Isabella, Black Cluster, White Sweetwater, Golden Chasselas, Fondante Vert, &c.

By E. Harkness of Peoria, Illinois, sixty-one varieties of apples, containing among them a number of western seedlings, to the names of which are attached notes by Mr. Harkness, which cannot but prove interesting to growers, viz: Barnhill Summer, a good August apple; Hockhocking, a beautiful August apple, tree hardy and a good bearer; Autumn Swaar, tree hardy, and a good bearer; Hamlins Summer, tree hardy and vigorous, but poor bearer, fruit middling; Wine apple, great bearer, tree hardy, and fruit first quality; Peoria Pippin, a profitable tree from its abundance and certainty of bearing, but the fruit is of medium quality; Harkness Bough, a vigorous tree, and an unrivalled bearer, it having now upon it over twelve bushels of fruit, and not planted out over ten years; White Apple, tree vigorous, and bears abundantly, but its fruit is not of first quality; Westfield Seek-no-further, this bears well and the fruit is uniformly good; Rambo, this also does well in Illinois, rich and sprightly, a good fruit; Maidens Blush, the tree proves tender and the fruit keeps but a short time; Daniel, a good September fruit; Yellow Ingestrie, a profuse bearer, fruit rather sweet, but of a very good flavor; Hagloe, too early for cider in Illinois; Newtown Spitzenburgh, does well, and is of first quality with us; Capps Baldwin, a first rate fruit (this may prove to be a synonym of some old variety); Pryors Red, the true variety; White Winter Pearmain, tree vigorous and good bearer, fruit good; Red Winter Pearmain, tree poor grower, but good bearer, fruit is good; Esopus Spitzenburgh, this variety does well with us; Flushing Spitzenburgh, the tree grows well, but has thus far proved to be a shy bearer; Talmans Sweet, does well with us; Holland Pippin, varies in size, but generally does well; Winter Pearmain from western N. York, bears well and proves to be a good fruit; Fulton or Fulton Beauty, this is believed to be one of the best apples now cultivated in the west, the original tree is standing in the orchard of Elijah Capps, Esq. of Canton, Fulton Co., and has produced for eleven successive years past, large crops of fruit, fully equal to Pryors Red, the tree is now about twenty years old, and was produced from seed which came from the orchard of General Harrison, at North Bend; Golden Russett, does well; Roxbury Russett, if this variety is no better "down east" than with us, it is hardly worth talking as much about as it has been; Winter Russett, a fine tree and good bearer, but a portion of the fruit cracks on the tree; Little Russett, a very nice little fruit, and the tree a great bearer; Smith's Cider, highly recommended by some persons; Michael Henry Pippin, proves a generous bearer and a good winter fruit; Green Newtown Pippin, usually does well; Yellow Pippin, commonly a fair fruit, has done poorly this season; Rosseau, a rampant grower and precocious bearer, the fruit generally small and not of very good quality; Jersey Black, a good fruit, but tree very poor; Red Romanite, a vigorous and a prolific tree, as well as hardy, this is a market fruit in the spring throughout the whole Mississippi valley;

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Rawles Janet; this is THE apple in Kentucky, the tree grows and bears very well here, but I have my doubts whether it is as good as in Kentucky; Grindstone, a long keeper, but invaluable; Limber Twig, a great bearer in this region, and the fruit excellent as late as May and June; Pennock, when free from the bitter rot with which it is affected, is a good fruit; Rhode Island Greening, does well here usually, but is this season small, as is most of our best fruit; Dominie promises well with us; Vandervere does well, and is considered a fair variety with us; Fulton Strawberry, a red fleshed variety, brought into notice by Stephen Dewey, Esq., of Fulton county, it is a good bearer and fine dessert apple when at maturity, keeps but a short time; Hughes' Virginia Crab, does well and bears abundantly; Golden Pippin, a good fruit, but a tender and feeble tree; Surprise, poor; Pumpkin Sweet, ditto; Virginia Blush, a variety from Augusta county, Virginia, a strong, hardy tree, a prolific annual bearer, and a very good fruit; Dutch Codlin, a poor fruit; Cherry Crab, more ornamental but less valuable than the Siberian; Fall Sweeting, a fine tree, and a very rich, sweet fruit.

By J. A. Kennicott, M. D., of the Grove, Cook county, Ill., twenty-six varieties of apples, viz: Fall Pippins, Spice Sweet, American Nonpariel, Keswick Codlin, Twenty Ounce, Young's Long Keeper, Westfield Seek-no-further, Roxbury Russett, Poughkeepsie Russett, Hawthornden, Lowell, Black Detroit, Sapson, Stanard's Seedling, Gloria Mundi, and several others not named; as also three varieties of crab apples.

By Elliott & Co., of Cleveland, Ohio, twenty-nine varieties of apples, viz: Fall Harvey, Lady Finger, Holland Pippin, Scarlet Pearmain, Rambo, Pomme Royale, Loan's Pearmain, Cable's Gillifleur, Jersey Sweeting, Court of Wyck, Winter Pearmain, Belmont, R. I. Greening, Maiden's Blush, Cumberland Spice, Dutch Codlin, Gravenstein, Swaar, Baldwin, Hollow Crown Pearmain, Molasses, Shippen's Russett.

VEGETABLES.

Judges: Robert A. Harper, Albany; H. C. Tuthill, Kelloggsville; James P. Fogg, Rochester; David Gray, Utica.

Best 12 carrots, C. F. Crossman, Rochester, $3.
Best 12 table beets, C. F. Crossman, Rochester, $3.
Best 12 onions, N. Culver, Arcadia, Wayne county, $3.
Best 12 tomatoes, C. F. Crossman, Rochester, $3.
Best 3 heads of cabbage, N. Culver, Arcadia, $3.
Best 12 sweet potatoes, do do $3.
Best 2 purple egg plants, C. F. Crossman, Rochester, $3.
Best half peck Lima beans, Jason W. Seward, Rochester, $3.
Best bunch double parsley, C. F. Crossman, $3.
Best three squashes, do $3.
Largest pumpkin, N. H. Langworthy, Rochester, $3.
Best 12 ears of seed corn, N. Culver, Arcadia, $3.
Best seedling potato, Hamilton Morrison, Montgomery, Orange county, $3.
Best and greatest variety of vegetables raised by exhibitor C. F. Crossman, $5.
Discretionary—Half peck Lima beans, James P. Fogg, Rochester, $3.
Three squashes, Lewis Eaton, Buffalo, $2.
do C. F. Crossman, $2.
Large pumpkin, N. Culver, $2.

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Sweet corn, C. F. Crossman, $2.

Table potatoes, Richard Cheney, Syracuse, $2.

Seedling potatoes, Luman Shepard, Skaneateles, $3.

Two egg plants, from Chicago, Illinois, finely grown, were exhibited, diploma.

Rev. George E. Delavan, of La Fayette, Onondaga, presented some potatoes grown from some tubers which were obtained from the Cape of Good Hope, with the manner of cultivation which is annexed. A diploma is awarded to Mr. Delavan.

Mr. Delavan's Statement.—Two varieties of potatoes were obtained from the Cape of Good Hope, in 1840, and delivered to D. C. Delavan, of Patterson, Putnam county. One variety failed; the other, of which the sample exhibited is the product, succeeded beyond expectation. The original number from which the Cape of Good Hopes have sprung was two. They are now brought home by the wagon load. They are solid, round, white, and well flavored, and seem to be an anomaly at the present day in this particular, that they do not rot.

Learning these facts, I obtained a barrel of them, last fall, to plant in this county. Half of them I gave to a friend in a neighboring town, but part of his were unfortunately frozen during the winter. The half barrel which I reserved to myself, kept through the winter without a single defect that I discovered.

Method of raising.—The present sample was raised on sward ground, behind a field of corn, in two rows, without manure; land, calcareous loam. The potatoes were cut into four or six pieces, and two pieces put in a hill. The hills were distant two feet by two and a half. They were hoed twice. The planting was about the 15th of May. The uniform practice for years has been, to dig them before the fall rains. The tops are now green, and the potatoes, on account of an uncommonly dry season with us, appear not to have come to their full maturity.

Some of the same variety were planted without cutting, on the same soil, but yielded no more. Another portion were planted on a corn stubble, and appear equally well; and still another portion were planted on ground from which an old blacksmith's shop had been removed, mixed with ashes and charcoal cinders, and yield well. In neither place, where I have dug, have I found a rotten potato of this year's growth. Of the future I cannot speak; but of the past I can say that, according to the best of my knowledge, the variety of potato here exhibited has not, within nine years past, been subject to the rot.

La Fayette, Sept. 10, 1849.

PAINTINGS, DRAWINGS AND DAGUERREOTYPES.

Committee.—E. P. Prentice, Ambrose Stevens, Alex. Thompson, M. D.

The premium list authorizes awards in five different classes; in some there was a large competition, in others none. The committee would suggest, that the miscellaneous portion of this department has become so extensive, that it is embarrassing in the extreme to act as a judge on relative merit. Art is difficult, delicate, and time consuming in execution by the artist, and equally difficult and delicate in the application of judgment to determine excellence. In this view, it is a question, if

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it were not better to confine the society's premium list within a smaller compass. The offering of premiums for artistic works, in the direction of special objects of an agricultural society, is obviously proper; and it well becomes *this* Society to reward art in this department. It should encourage the painting and drawings of domestic animals; the drawings of agricultural implements and machinery; and agricultural buildings in the department of rural architecture, both useful and ornamental; and the topography of farms. In all these branches of art, the daguerreotype may be employed as well as the pencil and the brush, and should receive premiums for such purposes.

Should the Society confine its premiums in this department to such objects, great benefit would result. The premium list now embraces only one of these objects, and not one drawing, painting, or daguerreotype, except cattle, was offered for examination. Is it well that this should be so? General taste and ordinary means of encouragement will ever stimulate art in its general direction; this Society would do well to induce the application of ability to objects immediately within the sphere of its peculiar designs.

Awards,

Animal painting in oil by an American artist—To B. F. Carpenter, Homer, Cortland co., a diploma for a portrait of a fat cow. To encourage a young artist rather than as evidence of superior merit.

Portrait of an animal, in oil, by a foreign artist, to Henry Strafford, of London, for a portrait of a distinguished bull, diploma. The committee take pleasure in saying, that this was the best cattle portrait, they have ever seen. The propriety of a medal to Mr. Strafford is suggested, in addition to the diploma.

For an animal portrait, to be the property of the Society, only one portrait offered, and that not of sufficient merit.

Drawing of show grounds, diploma to E. Forbes, Albany.

Daguerreotypes, D. E. Gavit, of Albany, and O. B. Evans, of Buffalo. The entries were numerous under this head, and the committee place Messrs. Evans and Gavit first, and divide the premium between them, and award a diploma to each.

One picture offered by Mr. McDonnell, of Buffalo, is highly commended; also a very admirable case of children, by E. T. Whitney, Rochester, diploma.

PAINTINGS AND DRAWINGS.

Mrs. J. L. Greenman, Syracuse, diploma, for mono-cromatic painting; Mrs. Anne S. Smith, Syracuse, diploma, for 3 mono-cromatic paintings; Henry Searl, Rochester, drawings in India ink, for patent office, diploma; I. T. Carr, Ithaca, specimens of penmanship, diploma; Miss Helen A. St. John, 13 years old, Fabius, Onondaga, painting in India ink, the Village School, very fine, diploma; Miss A. M. Hill, Canton, Onondaga Co., drawings and pencelings, commended. *Cameo Likenesses*, W. C. Mayhew, Buffalo, diploma.

STOVES.

94 *Entries.*

Judges.—Wm. Buel, Rochester; Peter Crispel, jr., Hurley, Ulster Co.,

The first premium, silver medal, awarded Mathew Murphey, Syracuse, for best cooking stove, for wood fire. The second, $5, Seym

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& Wood, Utica, for "Phœnix Air Tight." The first premium, silver medal, Forbes, Wright, & Co., Syracuse, for best cooking stove for coal fire, ("Ransom & Co's. patent air-tight," Albany.) Second, $5, William Wheeler, Troy. First premium, silver medal, B. F. Learned, Albany, for best parlor stove, "Chandelier." Second, $5, Bradley, Wheeler, & Co., Utica.

Transactions awarded, Charles H. Tozer, Syracuse, for flat-iron heaters; Foote & Owen, Seneca Falls, for self-regulator for stoves; W. J. Noyes, Troy, for best lot hollow-ware; J. A. Campbell, Buffalo, Morse's hot-air distributor, (fire grate;) and a diploma to R. H. Kirk, Newport, Herkimer Co.; for a beautiful and highly finished brass coffee pot.

The judges remark, that they find many improvements in the manufacture of stoves, which for use, durability, and cheapness, are worthy of attention. The number on exhibition was so large, as to preclude such an examination in all respects, as was desirable.

MISCELLANEOUS.

Judges.—G. W. Dobbin, Baltimore; T. D. Burrell, Geneva; Wm. Evans, Montreal, C. E.

Mr. DOBBIN, from the committee to whom was referred the list of articles classed as "Miscellaneous," after a careful inspection of the subjects to which the attention of the committee was directed, reports:

It must be borne in mind, that the inventive genius and mechanical skill of the country have been so stimulated by the public demand for their productions, and by the incentives to emulation afforded by these exhibitions, that many articles, though of great merit in contrivance and manufacture, having been some time before the public, and presenting now nothing new, do not require special description and commendation. The necessary consequence of these exhibitions must be, that the standard of excellence, with reference to pre-eminence for superiority of manufacture, must every year become higher; whilst that which depends upon novelty, will each year have an increased number of useful and tried predecessors to contend with. Hence it is that the distinctions awarded to excellence ought, in each successive year, to be more valuable, since in each year they may naturally be expected to be fewer and more difficult of attainment. The show of miscellaneous articles this year has been alike creditable to the exhibitors, the Society, and the State.

A Garden Vase, of cast iron, exhibited by Horace L. Emery, Albany,

Hale's Rotary pump, and Gatchel's Hydraulic Ram, exhibited by E. Robbins, Syracuse,

A Double-acting force pump for well, exhibited by D. Craw & Co., Schuylerville,

A double cylinder suction and force pump, exhibited by A. P. Cottrell, Watertown,

A cast-iron pump, exhibited by A. H. Fitch, Cuylerville, Livingston county,

A Hydraulic Ram, exhibited by Rapalje & Briggs, Rochester; are all articles of excellent manufacture, but present no distinguishing novelty.

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A. B. Smith's hydraulic ram is in the main like the others, with which the public has been long familiar; but Mr. Smith has introduced a new mode of regulating the action of the discharge valve, not, as is usually done, by controlling its play by screws upon the spindle, but by enlarging or contracting the opening through which the propelling current of water is discharged. This modification is ingenious, and deserves to be rewarded by the Society's Silver medal.

A. *B. Smith, Meredith, Delaware county.*—Six iron cistern pumps, one well pump, and one force pump, by Downes, Mynderse & Co. These articles are all made in the best manner, and do the manufacturers the highest credit. The distinguishing feature of the cistern and well pump, is the giving of a revolving motion to the spout, by which it may be made to discharge water upon any side. The contrivance to effect this is ingenious, and the mechanical execution excellent; but it may well be doubted, whether to obtain the small convenience of being able to turn the spout, the inventor has not introduced a greater risk of derangement in the introduction of a new working joint, which must be kept tight, or it had better not be there. The force pump is new, simple and ingenious, and has all the excellencies of form and workmanship, which distinguish the others. The committee think it deserves the award of the Society's Diploma.

A rotary fire engine pump, exhibited by A. W. Cary, Brockport, is of beautiful arrangement and manufacture, and seemed to perform its work in the most perfect manner. All persons, however, who are conversant with mechanics, are familiar with the practical difficulty of packing cylindrical surfaces to be subjected to rotary motion; and although these difficulties are said to be wholly overcome in this machine, yet it is to be feared that its complexity may require a skilful hand to manage it. It deserves, however, commendation for its ingenuity and excellence of workmanship, and a Silver medal is awarded.

Draining Tiles.

A specimen of draining tiles, consisting of several sizes of horse shoe tiles and soles, and several sizes of draining pipe. It would be out of place to say a word here upon the utility of draining, and the necessity which exists for a cheap and efficient draining tile. The article exhibited appears to possess all the qualities desired by the farmer in strength, excellence of form and cheapness, and was manufactured by B. F. Whartenby, in a machine imported from England by John Delafield, Esq., of Oaklands, Seneca co., called "Scragg's Patent Tyle Machine:" vide Transactions, 1848. page 666. The prices at which they are manufactured are as follows:

Horse shoe tile,	4	inches rise,	15	inches long, at	$15 00 per 1,000
do	3	do			12 50 do
do	2	do			10 00 do
Soles for 3 and 4 inch tiles, at					6 25 do
do	2	do			5 00 do
Drain pipes,	4	inches in diameter,	15	inches long,	16 00
do	3	do	do		14 00
do	2	do	do		10 00
do	1½	do	do		9 00
do	1	do	do		8 00

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Collars are also prepared to be used with the pipes, but except under peculiar circumstances they are not necessary. For their excellence, as well as for the introduction of the machine into this country, by which they are brought within the means of every farmer, they recommend that a diploma and Silver medal be awarded Mr. Delafield.

Five iron pumps, exhibited by John P. Cowing, Seneca Falls. These are excellent articles, made in a durable and workmanlike manner. By a very simple arrangement the brake may be changed into any position. Transactions.

A dairy steamer, exhibited by Thomas A. Paine. A well made article, got up at a moderate price, and where steam *must* be used, no doubt efficient for the ordinary use of a farm, though perhaps more complex than is desirable. B. F. Greene, Little Falls, Transactions.

A gate and specimen of fencing made of very light flat iron straps, arranged in the form of lattice work and riveted at the crossing. This article has not been subjected to the test of experience, and the inventor will probably find that it will hardly become a substitute for any of the fences now in use. E. R, Dix, Vernon.

An endless chain pump, No. 95. Since cast iron sucking and forcing pumps have been so cheapened and improved, it is difficult to conceive why this apparatus should be any where adopted. It seems rather like a retrogression, than an advance in the arts.

DISCRETIONARY PREMIUMS.

NO. 1.—The committee are aware that they have not been able to fulfil their duties as the public had a right to expect, on account of the uncommon number of articles coming within the range of their supervision, and from the difficulty of even finding many of the articles assigned to them. Some articles, also, they have rejected as not belonging to their class, although in their list, owing to the derangement occasioned by the illness of the principal clerk, Mr. Alleyn.

From the increasing improvement every year exhibited at our great fairs, in mechanical inventions, and the great labor required to examine and understand the construction and operation of complicated machinery, this committee recommend that hereafter the three committees be confined to specific duties, as follows:

No. 1, to articles all metal;
No. 2, do part of wood and part metal;
No. 3, do all wood;

which would simplify their duties and prevent confusion.

In the committee's awards they have given the Society's silver medal to the most meritorious articles.

L. B. LANGWORTHY,
JOSEPH SLOCUM.
Committee.

Syracuse, Sept. 14, 1849.

A Chronometer Mantle Time Piece.—As a piece of mechanism, very creditable to the maker, with isochronous hair spring, compensating balance, and all the frictional parts jewelled. James H. McClenthen, Baldwinsville, N. Y., diploma.

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A Portable Cider Mill and Press, standing on a wheel carriage, containing a double Nutt Mill and a press for the pomace. It cannot fail of answering expectations. Nathan Chapin, Syracuse, Diploma and Trans.

Pease's Rotary Steam Engine.—This is an engine upon an entire new principle, having an endless continuous cylinder, without crank on dead center, with elastic packing and very compact in form. From its ability to perform more work than the common cylinder engine, with the same fuel, of which fact evidence was exhibited to the committee, they think it to be the great *desideratum* so long sought after. George P. Strong, Rochester, Silver medal.

Bell Telegraph, two cases, for public houses, &c., which cannot fail of answering the purposes for which it was intended, and is a very valuable improvement. S. A. Hudson, Syracuse, Diploma.

A Machine for dressing Mill Stones.—Simple in its construction, and appears to perform that operation with facility and precision, which, if it succeeds, will save the health of thousands, who in the ordinary hand operation inhale the deadly particles. E. W. Hazzard, of Mainsburgh, Tioga county, Penn., Diploma.

Sarcophagus, or Metallic Coffins, three sizes.—There is something very agreeable and antique in their appearance, rendered unchangeable by moisture, by a vitreous glazing, a convenience in removing friends and preserving their form and features, and a great security against the desecration of the grave. Fish & Raymond, No. 209 Water-street, New-York, Silver medal.

An iron Water Wheel, which the exhibitors claim as an improvement upon the French turbine. It is highly recommended as combining all the advantages of percussion and re-action. H. Van De Water, Homer, N. Y., Diploma and Transactions.

Cast iron water and gas Pipes.—Made without a cone of any kind, by the centrifugal force of motion given to the mould and metal while in a state of fluidity. Can be made of any caliber or thickness of shell. The pipes are smooth, sound, even, and a perfect article. Thomas J. Lovegrove, Baltimore, Maryland, Silver medal.

Cylinder Glass, of large sizes.—An article of great brilliancy, transparent and of uniform level surface; equal to the French article, for glass cases and picture frames. A. Landgraft & Sons, Cleveland, Oswego county, N. Y., Diploma.

Palmer & Co's artificial Legs.—Of simple and scientific construction, imitating nature in all its motions and action, and is well worth the attention of the maimed. Palmer, Currier & Hudson, Springfield, Mass., Silver medal.

An ornamental medalion Picture Frame.—Got up in beautiful taste; the gilding splendid, solid, and the burnishing metallic, giving it great effect and brilliancy. John H. Thompson, of Rochester, Diploma.

Wilder's patent self-feeding power Drill.—The inventor has applied the principle of the *differential screw* to great advantage. A useful and indispensable article for smith's shops and various mechanical operations. C. Z. Cutting, Warsaw, Diploma.

A Fire Engine, presented by the Neptune Company from Utica. A magnificent piece of work, and from the fine order in which it was kept, the committee came to the conclusion that the members of said company understood their vocation, Diploma.

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A Boring and Mortising Machine.—For mortising hubs, and round and inclined work, a first rate article. Geo. N. Stearns, Syracuse, Diploma.

A Mortising Machine, constructed on mechanical principles and operates well. O. Cottle, of Syracuse, Transactions.

A Punching and Cutting Machine.—This is a machine of great power, well got up and a capital article. W. Race & Co., Seneca Falls.

Portable hand-power Cider Mill, on the grater principle, with the press combined, a neat affair, on a small scale. H. B Hoyt, Auburn.

Improved Window Sash and Frame.—A very simple and valuable improvement, rendering great advantages in its security and certainty of action, ease of taking in and out, and for completely excluding the air. C. M. Landers, Rochester, Silver medal.

Hand and Bench Screws.—These articles are got up mechanically, of good materials, and on right principles. C. F. Crosman, Rochester.

Saw Mill Dogs.—Nothing new in construction, but of excellent mechanical skill in the work and finish. J. M. Speed, Lyons.

Electro-Magnetic Generators.—A great variety, scientifically constructed and with excellent mechanical taste. Dr. A. J. Henderson, Buffalo, Transactions.

Dog Powers, for churning and other purposes. Neatly and cheaply constructed; the entire frame of iron, and work easily and correctly. Alonzo Howland, Stillwater, Saratoga co.

Machine for Sawing Angular, Bevel and Curvilinear faces, for ship building and various other uses.—A well constructed machine and performs its work with great speed and certainty. C. B. Wright, Rochester, Diploma.

Self-supporting Truss Frame, for extended floors in ware houses and other places, which cannot be supported, and may be advantageously applied to the construction of bridges. It seems a valuable invention and one much wanted. A. M. Badger, Rochester, Diploma.

Specimens of Pocket Knife Cutlery, from the Waterville Manufacturing Co., Conn. Equal in all respects, as to pattern and finish, to the imported articles, and of far superior temper and afforded at less prices. This exhibition is highly creditable to the country and entitled to public patronage. Exhibited by D. West, of New-York, Diploma and Silver medal.

A *Sewing Machine*, which makes a good strong stitch and with great speed, and promises to be a valuable labor-saving machine;

Also, a *Self-Acting Car* coupling, which, the committee were assured was in operation and worked well;

Also, a *Rotary Bench Hook*, a great convenience for cabinet makers, carpenters and workers in wood, and cannot fail of being appreciated by every mechanic that views it. Exhibited by W. Hobbs, Jr., New-York, Diploma.

Sabin & Benton's Reciprocating Buckets, for drawing water from wells. It has some advantages over any other that the committee have observed. It is simple in its operation and very effective. L. B. Benton, Penn Yan.

Fitzgerald's Portable Grist Mill.—It performs well, and has been so often commended, that this committee think they cannot add to its reputation.

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Weighing Scales.—Twenty scales, consisting of a cattle and hay weighing machine, railroad, wheat, portable platform and counter scales of superior workmanship and nicety of adjustment, with some valuable improvements over scales heretofore used; also, *Copying Presses*, *Sugar Mills*, and *Warehouse Trucks*, well finished, strong and durable. Duryee & Forsyth, Rochester, Silver medal.

Portable Platform and Counter Scales, embracing seven varieties, all well and carefully made, very sensitive and of great truthfulness, and exhibited great perfection of action. Hitchcock & Co., Rochester, Diploma and Transactions.

Sprout's Combined Carriage Springs.—An entire new arrangement, getting double the resistance and elasticity, with less expense and weight of metal. The committee recommend it as a valuable improvement, Silver medal.

A Chain Pump, for wells, &c., with galvanized chain and buckets, to prevent rusting. It works well and easily. L. Evans, Fayetteville.

Salt.—Six baskets boiled salt, and six cones do., in imitation of the Liverpool article. This is an important experiment in substituting anthracite coal for wood in boiling. It is a beautiful and pure article. Thomas Spencer, Syracuse, Diploma and Transactions.

Two barrels and five bags of ground solar salt, for dairy and table use; a very pure and superior article. Alfred Cobb, Syracuse, Diploma and Transactions.

Two baskets of common fine, and three bags fine ground salt; a very good article from boiled salt, and best manufactured ground salt exhibited. R. W. Nolton, Syracuse, Diploma.

One barrel of coarse solar salt, transparent and beautifully crystallized; the best article in this line submitted to the committee. S. C. Brewster, Geddes, Diploma.

Adams' Pump Coupling, for joining lead pipe to a wooden stock; a simple and effective contrivance. Also an assortment of *Coe's Wrenches*, easy to operate, and one of the best, if not *the* best extant. Also, *Ormsby's Dial Plow Clevis*, which easily adjusts the depth of furrow and the width of furrow slice. Horace L. Emery, Albany, silver medal.

Cloth Shearing Machine, with a valuable improvement in setting the shear blades, and their vibratory motion. Altogether a well made and desirable article. L. Wilder, Hoosick Falls, Diploma.

Arnold' Sash Fastener.—An article of great simplicity, operating with unerring certainty and safety, and of extreme cheapness of cost. The committee commend it to all who need the article, as the *ultima thule* of Sash lock improvement. W. E. Arnold, Rochester, Diploma and Transactions.

Deshon's Shower Bath, with a self-acting bellows pump, using over the same water as often as desired, and is simple and certain in its operations. D. S. Heffron, Whitesboro, Diploma.

Mill Stone Dressing Machine. A complicated machine, of various movements and ingenious construction. The committee are unable by inspection to decide its merits as opposed to other machinery for the same purposes. T. D. Burrell, Geneva, Diploma.

Washing and Wringing Machine.—This machine operates without friction or rubbing the clothes, and from the operation exhibited, the

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committee are disposed to think favorably of it. The wringing process is perfect. G. Goodell, Syracuse, Diploma.

Self-acting Sash Fastener.—The principle seems good, and acted well and easily. A. G. Poole, Syracuse, Diploma.

Tin Plate Working Machine.—With some new and valuable improvements, and of very superior workmanship. Royal W. Wilcox, Berlin, Conn., Diploma.

Coons' Rock Drilling Machine.—This is an article of great utility, operating with ease and certainty—a very valuable instrument and worthy of general introduction. M. P. Coons, Lansingburgh, Silver medal and diploma.

Patent Metallic Hoop Fastenings—dispensing with rivets, making a strong, secure, and smooth joint, and a great improvement over the riveting process. Samuel Pratt, Boston, Mass., Silver medal.

Improved and new arrangement of Springs for Railroad Cars, and model of cars for turning curves, which the committee think very favorably of, and is worthy of introduction. "J. F. Roger's Patent." Jason Smith, Troy.

Radial Die Screw Plate.—Easily adjusted to all sizes, and an improvement that cannot fail to come into general use. J. G. Northrup, Syracuse, Silver medal.

Wire-wove Cloth and Screening, of iron and brass wire, for paper mills, flour dusters, fanning mills, moulting floors, and various other purposes; from 6 to 60 meshes to the inch. The *fine* article was never before made in the United States, and the whole exhibition of articles is entitled to great credit. J. & S. Snow, Rochester, Silver medal.

A Napping Machine, with improved feed and take-up rollers, and other important improvements. A well constructed article, worthy the attention of manufacturers. C. P. Barber, West Troy, Diploma.

Twitchell's Self-closing Gate Swivel and Pulley.—A very neat and convenient improvement for front yard gates and doors. Willard Twitchell, Syracuse, Diploma.

Bedstead Fastenings.—Simple, strong, and cheap; superior to anything of the kind the committee have ever observed. H. B. Nash, Edinburgh, Saratoga co., Diploma.

An Attachment for the Hub and Axle. "Foster's Patent."—It appears to be simple and effective, with no extra friction, and excludes all foreign substances. Alfred E. Smith, New-York, Diploma.

Meneely's Bells.—They do not need the praise of the committee—they always speak for themselves; and his surveying and leveling instruments are of the highest order of workmanship. Having received premiums heretofore, the Certificate of the Society is awarded. A finely finished bell, weighing 287 lbs., keyed on letter A, with the following inscription: "Presented to General Zachary Taylor, President of the United States, by Andrew Meneely, Founder, West Troy, N. Y., 1849." Silver medal.

Patent Double Gage Clevis.—A useful article, and cheap. J. Van Brocklyn, Middleport, Niagara co., Transactions.

A Cylinder Dynamometer, (new,) for testing the draught of plows, machines, &c. This instrument is constructed upon principles mechanically and philosophically correct—the displacement of a fluid through a small orifice from one chamber of a cylinder to another, in which both time of action and forceapplied by known results, determine the

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resistance. This machine, when perfected, will approximate nearer to giving the true resistance of the great varieties of the plow than any other yet introduced, and is far more reliable than the vacillating, unsteady spring instruments hitherto used. It will be useful in determining the traction of wheel carriages, cars, boats, and in all cases where friction and the resistance of moving bodies are required. H. L. Emery, Albany, Silver medal.

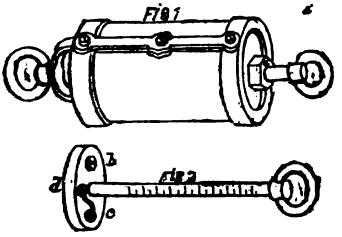

Fig. 1. Represents the instrument complete.
a. Fig. 1. Represents the stuffing-box.
d. Fig. 2. The piston detached, and showing graduations on rod.
b. Fig. 2. The orifice through the piston for passage of fluid.
c. Fig. 2. Poppit valve.

NO. 2.—*Judges.*—Henry Fitzhugh, Oswego; Seth C. Jones, Rochester; W. H. Bogert, Aurora.

Diplomas awarded.—J. T. Jones, Utica, for a two seated carriage. Mead & Wait, Albany, for patent leather boots, very superior. Smith & Feltman, Albany, for best britannia and argentine ware. J. H. Whitlock, Troy, best cast and turned britannia ware. C. F. Hoag, Schenectady, lot of hollow ware. Anderson, Erwin & Farwell, Erwin Centre, self-acting machine for burning gas. John L. Allen, Cazenovia, dentist work. James A. Hurst, 81 Genesee st., Utica, for case of animals elegantly arranged and well preserved. William R. Kelsey, Syracuse, fruit gatherer, very nice and useful article. Benj. Briare, Albany, agricultural cake, very elegantly got up. David Maydole, Norwich, implement for trimming sheep's feet, edge tools and hammers. D. Harris, jr., Albany window shades, very superior. Lewis Lillie, Troy, best bank lock.

Silver medals.—Miss Adeline Hayden, Albany, pyramid of paper flowers, elegantly wrought. Holbrook & Stanley, Cleveland, Ohio, best lard oil, adamantine and starr candles, very superior, and equal to sperm in appearance. D. R. Barton, Rochester, set of tools, chisels, augers, &c., a beautiful display. W. W. Bryan, Rochester, kit of coopers tools. Clark & Gilman, Rochester, moleskin hats, very fine, (medal and diploma.) Leonard Smith, Troy, smut machine, a very superior article and best on exhibition. Moses Miller, Fort Ann, Miller's patent sleigh and cutter, valuable improvement. W. F. Curry, Dansville, microscope. James H. Hurst, Utica, cases of birds, very beautifully arranged and preserved. R. T. Norgrove, Syracuse, very superior trunks and ladies side saddle.

Transactions.—D. W. Smith, Springfield, Vermont, bank lock. Wilcox & McCulloch, Syracuse, Wilson's patent fall for hoisting and lowering merchandize. D. W. Seeley, Carlisle, buggy wagon, with new coupling, very valuable improvement. H. F. Phillips, Skaneateles, carriage hub and axle. M. Sullivan, Mohawk, five horse shoes. G. Smith, Oswego, smut machine. John Putnam, Greece, three barrels. Miss L. A. Hannay, Hopewell, peacock fly-brush. Solomon Goddard, Truxton, buggy wagon. Thomas Barnes, Rochester, elderberry wine. Van Buren & Clary, Syracuse, oak tanned calf skins. C. Bates, Syra-

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cuse, sole leather. Charles A. Bogert, West Dresden, ventilated mattresses. E. S. Walbridge, Oswego, hair and spring mattrasses. N. Clark & Co., Lyons, stone ware. J. S. & A. V. Alcott & Co., Oriskany Falls, frame of sample carriage tire and spring bolts. S. T. Jeffrey, Homer, hand plane. B. T. Babbit & Co., 70 Washington st., N. Y., saleratus, double refined, very superior. S. H. Ayres, Cincinnati, Ohio, chemical magic washer. D. & T. N. Hollister, Truxton, potato starch, very superior. W. Hogle, Fort Covington, saleratus, very fine. Misses A. & A. Palmer, (12 years old,) pencil sketches, very fine for girls of their age, $2.

Description of one of the five cases of birds entered for competition at the Syracuse meeting, by J. A. Hurst, Utica, for which he was awarded a silver medal.

The case was of polished black walnut, with a glass measuring 30 by 40, containing 69 birds and animals, beautifully arranged, with a miniature fountain in the centre, playing a stream of water, ducks and geese swimming round, which gave it truly a life-like appearance. It drew great attraction. We think it the most perfect piece of taxidermy ever exhibited in our State.

The following are the names of the birds and animals contained in the case:

Ricebird, Dolichonyx oryzivora, (male & female.) Linn.
Cowpenbird, Molothrus pecoris, (male & female.) Gmel.
Red and White-winged Troopial, Agelaius tricolor, (male.) Aud.
Red-winged Starling, Agelaius phœniceus, (male.) Linn.
Baltimore Oriole, Icterus baltimore, (male & female.) Linn.
Crow Blackbird, Quiscalus major, (male.) Viell.
Meadow Lark, Sturnella ludovicianae, (male.) Linn.
Cedar Waxwing, Bombycilla carolinensis, (male & female.) Briss.
Ruby-throated Hummingbird, Trochilus colubris, (m. & f.) Linn.
Belted Kingfisher, Alcedo alcyon, (male.) Linn.
Yellow-bellied Woodpecker, Picus varius, (male & female.) Linn.
Red-headed Woodpecker, Picus erythrocephalus, (male.) Linn.
Golden-winged Woodpecker, Picus auratus, (male & fem.) Linn.
Black-billed Cuckoo. Coccyzus erythrophalmus, (male.) Wils.
Woodcock, Microptera americana, (male.) Aud.
Least Bittern, Ardea exilis, (male.) Wils.
American Robin, Turdus migratorius, (male.) Linn.
Tawny Thrush, Turdus wilsonii, (male.) Bonap.
Tit Lark, or Tipit, Anthus ludovicianus, (male.) Tich.
Snow-lark Bunting, Plectrophanes nivalis, (male & female.) Linn.
Indigo Bunting, Spiza Cyanea, (male.) Wils.
American Gold Finch, Carduelis tristis, (male & female.) Linn.
Purple Finch, Erythrospisa purpurea, (male & female.) Gmel.
Rose-breasted Grosebeak, Coccoborus ludovicianus, (male.) Linn.
Scarlet Tanager, Pyranga rubra, (male & female.) Linn.
Sparrow Hawk, Falco sparverius, (male.) Linn.
Cooper's Hawk, Astur cooperi, (male.) Bonap.
Chimney Swallow, Chætura pelasgia, (male.) Linn.
White-bellied Swallow, Hirundo bicolor, (male.) Vieill.
Kingbird, Muscicapa tyrannus, (male.) Linn.
Pewee Flycatcher, Muscicapa fusca, (male.) Gmel.

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Passenger Pigeon, Ectopistis migratoria, (Linn.)
Ruffed Grouse, Titrao umbellus, (male.) Linn.
Kildeer Plover, Charadrius vociferus, (male.) Linn.
Spotted Sandpiper, Totanus macularius, (male.) Wils.
Wilson's Snipe, Scolopax wilsonii, (male.) Temm.
Yellow-crowned Warbler, Sylvicola coronata, (male & f.) Lath.
Chesnut-sided Wood Warbler, Sylvicola icterocephala, (m.) Lath.
Black-throated Green Wood Warbler, Sylvicola virens, (m. & f.) Lath.
Blue Yellow-backed Wood Warbler, Sylvicola americana, (m&f) Lath.
Bluebird, Sialia wilsonii, (male.) Swains.
Catbird, Orpheus carolinensis, (male.) Linn.
Yellow-throated Wood Warbler, Sylvicola pensilis, (male.) Lath.
Yellow-poll Wood Warbler, Sylvicola estiva, (male & fem.) Gmel.
Hemlock Warbler, Sylvicola parus, (male & female.) Wils.
Quail, Ortix virginiana, (male.) Linn.
Gray Squirrel, Sciurus lencotis, (male.)
Red Squirrel, Sciurus hudsonicus, (male.)
Striped Squirrel, Sciurus striatus, (male.)
Weasel, Mustela pusilla, (male.)
Deermouse, Muriones americanus, (male.)

The articles in this department were so numerous that the judges felt it impracticable to do full justice to them all. They cannot but express their admiration of the display of ingenuity, and superior workmanship exhibited in a very large number of the articles submitted to their examination. They recommend to the Society, the importance of encouraging the exhibition of articles of ingenuity, and skill in every department.

NO. 3.—*Judges*—A. Z. M'Carty, Pulaski; Walter Chester, Erie Penn.

The judges have examined with all the care their time and opportunities would permit, the various articles submitted. The number examined is very large, and many of them in the highest degree useful, evincing in a preeminent degree, the inventive genius of our mechanics. With the whole exhibition they are much gratified, and they would have gladly extended a notice to many more articles, had they been entered at an earlier period, so as to have afforded a more careful examination. It is respectfully suggested to the Executive Committee, that the articles entered for exhibition as discretionary, should be placed so that each committee could find their articles arranged in one locality. This would secure a more careful examination, and would conduce to the convenience of all.

Transactions are awarded for furniture polish a very valuable article, B. W. Durfee, Rochester. A case of boots and shoes of very superior workmanship, A. Root, Syracuse. A flint enamelled picture frame, a very handsome article, Frederick Day, Northampton, Mass. Segars, tobacco and snuff of very fine quality exhibited by D. & D. O. Salmon Syracuse. Shoe lasts, very excellent articles, E. Robbins, Syracuse. A case of books, binding excellent, A. G. McGlashan, Syracuse. Four varieties of glue, very superior quality, John H. Dana, Rochester. Sofa, two tete a tetes, six rosewood chairs, highly finished, J. D. Morton, Syracuse. A box of stocks and dies superior workmanship, J. M. King & Co. Waterford. Fine collection of saddlery hardware, of superior workmanship and finish, combining all recent useful improvements in the articles exhibited, C. Pope & Co., Syracuse.

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A case of medicine beautifully put up, Dr. Ford, Syracuse. Four boxes American tobacco and segars, Church & Burdic, Syracuse, of fine quality and manufacture, and put up with skill and taste. Without desiring to extend or encourage the use of this article, the committee cheerfully bear witness to its excellence, as certified by those in whose judgment they can confide, (the judges, neither of them, using the article.) The tobacco was raised in the county of Onondaga, and it is affirmed by competent judges, both in flavor and perfume, almost if not quite equal to that of Havana, and such as would gratify the taste of the most exquisite. Four pieces of sculpturing in wood, which display unusual taste in the young artist, A. Ames, Buffalo. Six specimens of fire screens, very durable and well made, Lewis Griswold, Lyons. Three oak baskets, a valuable article for the farm, and very well and neatly made, Truman Roberts, Tully. A very handsome sample of straw board for book-binders, S. D. Paddock, Sullivan. A lot of broom handles, very neatly made, J. E. Didama, Perryville. A lot of buckskin, tanned for mittens, well done and serviceable, W. B. Peabody, Springwater. A stand for candle moulds, very finely made, Willis Hamilton, Troy. Self acting shackle for connecting railroad cars, which appears a valuable and superb invention, William Miller, Chicopee, Mass. Portable water closet, and metallic window sash, very well made and durable articles, Wm. Eager, Syracuse. Telegraph water-carrier, an ingenious invention, G. R. McElroy, Scotland, Penn. Steam, wash, and cooking boiler, B. P. Learned, Albany. Bell trimmings, beer pump and trimmings, J. M. Brown, Syracuse. Set wagon stakes, F. G. White, Geddes. Steam table waiter, and knife polisher, a very valuable improvement for invalids, and will be useful to every family, R. C. Taylor, Auburn. Model of a bridge, apparently useful, Charles Hinman, Lockport. Lot of whips and whalebone canes, of very superior workmanship, A. Holton, Syracuse. Apple paring and coring machine, a very effective machine, S. J. Decker, McGrawville. Dissecting map, Samuel McClary, Hoosick. Noddle iron and stirrups for saw mills, well made, Gideon Hotchkiss, Windsor. Firemen's cap, a finely made article, Johnson & Barnum, Syracuse. Model of Baker's patent bedstead, Elisha K. Fellows, Brutus. Bottle cleaner, a very convenient article, W. Cronk, Auburn. Washing machine, much improved, A. G. Foster, Auburn. Horse shoes and shoeing, C. W. Draper, Dryden. Paring machine, very ingenious, Sidney Palmer, Skaneateles. Boot-plane, a very good article, H. Spalding, Otisco. A self-acting blow pipe, a well made and very neat article, A. Hinman, Brockport. Cultivator teeth, useful and well made articles, D. R. Rogers, Seneca Falls.

Silver Medals—For very fine specimens of guns and rifles of very superior finish, John Rector, Syracuse. Specimens of book-binding of most extraordinary excellence and superior workmanship, A. L. Harrison, Albany. Sanborn's patent bedstead fastener, a very valuable invention, T. C. Peters, Darien. Window sash and gate fastener, a very ingenious and valuable improvement, James C. Cochran, Rochester. Fine writing, carmine, and indelible ink, and liquid hair dye, E. Waters, Troy. Window spring, model door spring, and curtain springs, a most excellent and valuable article, accomplishing what it is designed to do, E. L. Ray, Bristol, Con. Splendid exhibition of fire-works, prepared by John A. Clark, Albany. Very superior elastic suspenders and

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shoulder braces, most elegantly got up, and a very useful article, K. V. R. Lansingh, Albany.

Diplomas—For superior sash lock and ketch, A. G. Poole, Syracuse. Apparatus for disengaging horses from carriages, an excellent article of superior merit and useful design, Ira Glynn, Syracuse. History of Onondaga, written, printed, published, and the mechanical department executed in the county, W. W. Newman, Syracuse. Mineral Composition Machine Belting, a new and useful article, which, from its appearance and the testimony of those having experience, is best adapted to the object for which it is designed, Ross & Smith, Rochester. Anti-mildew Preparation, for preserving clothes, sacks, tents, &c., a valuable chemical preparation, T. H. Moakley, Albany. Fine Cut Manufactured Tobacco and Segars, Avery, Furgason & Co., Rome. Box Dentistry, very finely got up, J. W. T. Rice, Cazenovia. Hydralator, or Water Elevator, John J. Vedder, Schenectady. Machine Hoops, turned and split at one operation, a very valuable invention, D. S. Heffron, Whitesboro. Specimen of Blank Books, of very superior workmanship, A. L. Harrison, Albany. Letter and Cap Paper, manufactured at Milton, Saratoga county, and pronounced by those who had examined it very superior, and equal to that from any part of our country, Colt & Crane, Ballston Spa. Model Gate Hinges and sample of American Bolts, very superior, Seymour & Brothers, Westmoreland. Patent right Graduated Door Spring, Thomas Peck, Syracuse. Model of a Railroad brake, a very valuable improvement, C. B. Turner, Buffalo. Axe Helves, very superior, John Thompson, Syracuse. Mrs. Dr. Cardeli, Baldwinsville, for a very pretty box of wax fruit and flowers, Thomas' Fruit Culturist; Same to Louisa Isham, Syracuse, for two small cases wax flowers, very nicely got up.

MUSICAL INSTRUMENTS.

Judges.—Senter M. Giddings, Brooklyn; H. W. Rogers, Buffalo; C. Van Benthuysen, Albany.

The committee on musical instruments report, that they have examined the various piano fortes presented to them for examination, and have unanimously awarded to Messrs. Boardman & Gray, Albany, the first premium, for a 7-octave piano, of high tone, beautiful pattern and workmanship.

The attention of your committee was called to the Dulce Campana Attachment, recently invented by Messrs. Boardman & Gray. This attachment, involving a well known principle in the arts under a new application in practice, simple, and at the same time wonderful in its results, of comparatively small expense, and easily applied by the inventors to all piano fortes of modern style, your committee consider to be the greatest improvement ever yet made in this instrument, rendering its tones liquid, mellifluous, and plaintive beyond description. Occupying but small space within the piano, and rather adding to its internal beauty than otherwise; embracing a range of tone entirely new, and at the same time so easily applied that a few moments instruction brings it within the control of the performer; giving to an instrument, at this day within the reach of nearly all families, a melody incomparably more sweet than it has ever possessed before, your committee very cheerfully recommend this attachment to the piano forte to the attention

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of all lovers of harmonious sounds. The committee recommend to the executive committee of the Society to award to Messrs. Boardman & Gray, a Gold medal.

The committee award to T. Gilbert, of Boston, for a compound instrument, consisting of a piano with harp and Eolian attachment of the lamented Coleman, which was entered for exhibition only, a Diploma.

GRAIN, FLOUR AND WOOL.

Judges.—J. G. Markel, Waterloo; Augustus Sanford, Norwich.

Best sample of winter wheat, one barrel, (white blue stem,) Timothy Judson, Portland, Chenango county, $5; second, Hamilton Murray, Oswego, Crate wheat, $3.

Best sample oats, one barrel, E. R. Dix, Vernon, Oneida county, $5.

Best sample barley, do do do do

Best barrel of flour, Oviat & Stone, Rochester, diploma; second, Wm H. Hanford, Honeoye Falls, Transactions.

Best fleece fine wool, J. G. Strean, Washington Penn, diploma.

John Holbert, Chemung, two butter firkins, Diploma and Transactions.

Prescott and Hotchkiss, Phelps, Ontario county, kiln dried meal, Dip.

The judges desire to notice 31 varieties of wheat, presented by Gen. Roswell Harmon, Jr., Wheatland, all of his own production, the culture, as also the arrangement of which does great credit to General Harmon. We would notice, as among the best samples, Red Beard, White Provence, Wheatland Red, Canada Flint, Blue Stem, Chatham, Etrurian, Souls and Flint. These samples have all been deposited by the exhibitor in the museum of the Society. General Harmon brought samples of the straw and heads of all the varieties he exhibited, which were destroyed, probably by persons who little appreciated their value. It is much to be regretted, as the Society have for years been desirous of obtaining the straw and head of the various varieties, for examination and comparison. It is hoped General Harmon may succeed another season, and efforts will be made to secure the samples from injury.

Two samples, presented for premium, of the requisite quantity, both beautiful specimens.

The judges felt great diffidence in discriminating among so many superior samples of flour as were presented. All were of superior quality, showing the great skill and perfection to which the manufacture has attained. After a long and careful examination, they awarded the first premium to No. 73, Oviat & Stone, Rochester; the second, Wm. H. Hanford, Honeoye Falls.

A great many other specimens presented were well worthy, among which they would name No. 28, John Rollins, Jr., Manlius; No. 4, Stephen Mercer, Onondaga Hollow; No. 6, Charles Ross, Syracuse; No. 12, Hamilton Murray, Oswego.

Kiln Dried Corn Meal.—A specimen put up for exportation, was exhibited by Prescott & Hotchkiss, of Phelps, Ontario county. We found it prepared in the most skilful manner, rivaling any article of the kind we have ever seen made in this country, and deserving the favorable notice of the Society. A diploma is recommended.

Wool.—The exhibition of this staple article of our country was not as large as could have been wished—owing, doubtless, to the fact, that

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but few were aware that wool was included among the articles for exhibition. There were many fine samples presented, but only one of the required quantity—a very superior lot of fine wool, to which the premium is awarded. J. G. Strean, Washington, Pennsylvania, 8 fleeces.

H. Blanchard, of Kinderhook, presented seven sorts or qualities, as sorted at his wool depot, for sale, in super., extra, prime No. 1, 2, 3 and 4. Three of the lowest were Delain wool, but corresponding, nearly, in quality, to the numbers in the table; and exhibited great skill in the sorting, and of great advantage to manufacturers, as it enables them to obtain without trouble the various qualities most adapted to their respective wants, Diploma.

Beautiful samples were exhibited by Mr. S. B. Crocker, of Vernon, Oneida county; Also from the flocks of L. A. Morrell, Lake Ridge, Tompkins ; Gilbert Brownell, Cayuga ; Abraham Per Lee, Chenango; Edward Peck, and M. C. Luther, Otsego; John Thomas, James A. Thomas, William Miller, H. Foreman, Abraham Thomas, and D. C. Thomas, of Delaware county.

It is suggested, that a different method of presenting wool be adopted hereafter. Let each grower who exhibits, select a sample from each fleece of his flock, say merely a small lock, and paste it nicely on to a sample card, and present it in this shape. By this means, the committee can judge who has the best flock, and consequently, who takes the most pains in breeding fine wool sheep. These samples might all be required to be deposited in the museum of the Society, for future reference.

Hovey & Woodbury, of Little Falls, presented a very beautiful sample of flax, and as no other committee had charge of it, we awarded them a vol. Transactions.

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ANNUAL MEETING, JANUARY 16, 17, 1850.

The Society met at the Assembly Chamber, which had been kindly opened to them by the honorable the House of Assembly, on Wednesday, the 16th of January, at 12 o'clock. A much larger representation of farmers and delegates from county societies were present, than usual.

The Secretary called the meeting to order, and read a telegraphic despatch from the Hon. John A. King, President of the Society, announcing his detention on his way to the meeting, by a severe storm—but would be present at the evening session.

Hon. John P. Beekman, ex-president, was appointed chairman.

Mr. Johnson, corresponding secretary, read an abstract of the report of the Executive Committee; and Mr. Tucker, treasurer, presented his report, both of which were accepted, and ordered printed, with the Transactions.

On motion of Mr. Peters, of Genesee, a committee of three from each judicial district was appointed by the members in attendance, from the districts, to nominate officers for the ensuing year, and to recommend to the Executive Committee a place for holding the Fair.

The following are the names of the committee selected.

1st District—A. Gilbert, J. Monroe, A. Stevens.

2d District—E. W. Fisk, John A. Lott, A. C. Bradley.

3d District—G. Vail, J. P. Beekman, A. Van Bergen.

4th District—S. Cheever, LeRoy Mowry, G. T. Thomas.

5th District—E. Comstock, H Baldwin, H. Clapp.

6th District—B. Enos, O. C. Chamberlain, P. Barber.

7th District—J. M. Sherwood, J. Delafield, E. Harmon.

8th District—T. C. Peters, S. M. Burroughs, E. Ford.

Mr. Pardee, of Wayne, referred to the action of the Wayne County Agricultural Society, in favor of having two State Fairs annually—one in the eastern and the other in the western district, and offered a resolution to that effect.

Mr. Cheever said the Society had no power to comply with this suggestion, until the constitution of the Society should be amended.

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Mr. Pardee replied that he proposed but one society and one set of officers; but two fairs. This object could be attained without any difficulty.

Mr. Sherwood moved to refer the resolution to a select committee.

Mr. Stevens expressed the opinion that the resolution should go before the Executive Committee.

The resolution was laid on the table.

Mr. Butterfield suggested the propriety of holding the fair for four days—one day to be devoted to the sale of stock. He moved that the committee just appointed take this subject into consideration. Carried.

Adjourned to 4 o'clock.

After recess, Mr. Enos, of Madison co., from the committee to whom was referred the nomination of officers, and the question of location for the next fair, respectfully reported the following names as candidates for the several offices:

For President:

EZRA P. PRENTICE, Albany.

For Vice Presidents:

I District—AMBROSE STEVENS, New-York.
II " LEWIS G. MORRIS, Westchester.
III " ANTHONY VAN BERGEN, Greene.
IV " ZEPHANIAH C. PLATT, Clinton.
V " JOHN B. BURNET, Onondaga.
VI " E. C. FROST, Chemung.
VII " OLIVER PHELPS, Ontario.
VIII " NELSON VAN NESS, Chautauque.

Corresponding Secretary:

BENJAMIN P. JOHNSON, Albany.

Recording Secretary:

J. McDONALD McINTYRE, Albany.

Treasurer:

LUTHER TUCKER, Albany.

Additional Members of Executive Committee:

B. B. KIRTLAND, Rensselaer.
Dr. HERMAN WENDELL, Albany.
HENRY WAGER, Oneida.
Dr. ALEXANDER THOMPSON, Cayuga.
JOHN J. VIELE, Rensselaer.

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The committee have also agreed to recommend to the society and through it the Executive Committee, to locate the next Cattle Show and Fair at Albany, provided the citizens of the place furnish funds to be expended under the direction of the Executive Committee, sufficient in amount to defray expenses of erection of enclosures, buildings, police, clerk hire, and such other necessary expenses as the committee may require.

The resolution of Mr. Butterfield, which was referred to this committee, was considered, and a resolution passed asking that it might be referred to the Executive Committee.

The report was accepted and the officers recommended by the committee were unanimously elected by ballot.

The Secretary read the proceedings of the Executive Committee on the proposed "Industrial Fair of all Nations," to be held in the city of London in 1851, and submitted on behalf of the Executive Committee the following resolutions:

Resolved, That New-York State Agricultural Society have received with much satisfaction notice of the proposed exhibition in honor of the *Industry and Arts of all Nations*, to be held in London in 1851,—that our agriculturists, manufacturers, mechanics and inventors be encouraged to prepare for the exhibition, and that the Society will, as far as in their power extend facilities to those who may be desirous of competing at said exhibition.

Resolved, That the Corresponding Secretary cause a copy of the above proceedings to be furnished under the seal of the Society, to the persons having the charge of the contemplated exhibition in London.

The resolutions were unanimously adopted.

The subject was discussed with great ability by Mr. Baldwin of Onondago, Mr. Bradley, Staten Island, Mr. Peters, of Genesee, Mr. Cheever of Saratoga and others, and several suggestions made as to what action would be proper on the part of the Society.

On motion of S. A. Foote of Ontario, the whole subject was referred to the Executive Committee, with full power to adopt such measures as in their judgment would be best adapted to carry out the views of the Society, as expressed in the resolutions adopted.

On motion of Mr. Peters:

Resolved, That an application be made to the Legislature for an appropriation of two hundred and fifty dollars for the purpose of increasing the Library of the Society, and one hundred dollars for the Agricultural Museum.

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On motion of Mr. Smith of Schoharie:

Resolved, That this Society memoralize Congress at its present session for the establishment of an Agricultural Bureau.

A letter was read from Dr. Lee, of Washington, on the subject of agricultural tracts. (Referred to the Executive Committee.)

Mr. Cheever, of Saratoga county, offered the following resolution:

Resolved, That the constitution of this Society be so amended that the ex-presidents shall be standing members of the Executive Committee, in addition to those annually chosen.

Mr. Cheever, Mr. Peters, Judge Osborn, of Albany, Mr. Baldwin and others, engaged in the discussion which arose on the resolution; and the same was laid upon the table.

Mr. Butterfield, of Utica, offered the following resolution:

Resolved, That this Society recommend to the Executive Committee to offer a premium to the person or persons exhibiting any articles of manufacture, or agricultural implements, or animals of any description, or any kind of grain or root crops, or of any species of articles that are worthy of receiving premiums agreeably to the rules of this Society, that shall be taken to the great national fair to be held in the city of London, in the year 1851, of not less than one hundred dollars, for the articles that take a premium at said fair, agreeable to the rules of this Society.

Mr. Peters offered a resolution that the Executive Committee, be requested to take means to ascertain the expenses of fencing throughout the State. Referred to the Executive Committee.

Adjourned to 7½ o'clock P. M.

WEDNESDAY EVENING.

The Society met at the Assembly Chamber, and the Hon. John A. King, President of the Society, being present, called the Society to order.

Professor Johnston then delivered a lecture on the relations of Chemistry to the soil, and its practical improvement, which was listened to by a crowded audience, composed of the members of the Society and of both branches of the Legislature, with great interest; and at its close, manifestations of applause were given from every portion of the house.

Hon. H. Baldwin, of Onondaga, offered the following resolution, as a substitute for the resolution of Judge Cheever in relation to ex-presidents; and the same, after remarks from Judge Cheever and Mr. Baldwin, was adopted.

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Resolved, That the ex-Presidents of this Society, not members of the Executive Committee, shall constitute a board of councillors, to which may be referred, for consultation and advice, all questions that may from time to time arise, and in the decision of which the Society may in any manner be interested.

The Society adjourned, to meet at the Agricultural Rooms on Thursday, at 10 A. M.

THURSDAY.

The Society met, pursuant to adjournment.

Col. J. M. Sherwood, ex-President, in the chair.

The reports of Committees on dairies, butter, and cheese, grain and root crops, were read and adopted. Mr. Pardee's resolution relative to two State Fairs, was referred to Executive Committee.

Mr. H. L. Emery offered a resolution, that a committee be appointed to memorialize the Canal Board for the reduction of tolls on agricultural implements, &c., going West, placing these articles in the same list of tolls with other specified articles. The resolution was adopted; and Messrs. Johnson, Tucker, and Emery were appointed the committee.

The Society adjourned to 7½ P. M. at the Capitol.

THURSDAY EVENING.

The President, Mr. J. A. King, called to order.

Mr. Delafield, of Seneca, from the committee on Essays, Experiments, and Works on Schools, presented their report.

To Mr. Charles L. Flint, of West Roxbury, Mass., for an Essay on Indian corn, the committee recommend the thanks of the Society, with a Silver medal.

To Mr. A. Clarke, of Yates, a volume of the Transactions, for experiments on the sowing of wheat.

The committee announced that there are already 160 essays embodied in the Transactions of the Society, of the most useful kind to the farmer.

To Mr. Daniel Gates, of Madison co., the committee award a volume of the Transactions, for his Essay on the construction of drains.

The committee recommend that a premium be offered for the best Essay on Mechanics, to be divested, as much as possible, of technicalities.

To Prof. J. P. Norton, of Yale College, the committee recommend the the award of the premium of $100 for his Essay on the *elements of scientific agriculture.*

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Mr. Peters moved the acceptance of the report, and that it be printed in the Transactions of the society. The motion prevailed.

Dr Beekman moved that the essay be referred to the Executive Committee for their examination, and that if they consider it worthy, that they cause to be printed 1,000 copies, at the expense of the Society; the volumes to be awarded as premiums of the Society.

The resolution was adopted.

Mr. Cheever presented the report of the committee on farms.

To E. S. Salisbury, they awarded the second premium, Silver cup, value $30.

To Helim Sutton, of Seneca co., a set of the Transactions.

The Secretary announced the following additional awards:

Butter Dairies.

Horace Clapp, Houseville, Lewis co., first premium, Silver cup, $50.
John Holbert, Chemung, Silver cup, $30.

Butter.

Horace Clapp, Houseville, Lewis co.; Joseph Cary, Albany; John Holbert, Chemung; Hector C. Tuthill, Cayuga co.; each a Silver cup, $15.

Noah Hitchcock, Jr., Homer, Cortland co., Silver cup, $10.

Winter Wheat.

Adam Clark, West Dresden, Yates co., 5 acres and upwards, 42 bus. 20 lbs. per acre, $10.

J. J. Thomas, Macedon, Wayne co., experiments with wheat, $5.

Spring Wheat.

George K. Eells, Westmoreland, Oneida, 37 bus. 39½ lbs. per acre, $15.

H. B. Bartlett, Paris, Oneida, 31 bus. 13 lbs. per acre, $10.

Rye.

David Conrad, Brunswick, Renss. co., 36 bus. 4 lbs. per acre, $15.

Indian Corn.

E. R. Dix, Vernon, Oneida, 83 bus. 4 quarts per acre, $20.

Peter Crispel, Jr., Hurley, Ulster co., 80 bus. 15 quarts, $15.

A volume of Transactions awarded to C. W. Eells, Augustus Flint and Wm. Baker, each of whom exhibited fine samples of corn in the ear.

G. S. Sherwood, Oswego co., presented a statement showing that he had raised 119 50.60 bushels corn on one acre and four rods of land. Ira Apthrop, of Riga, Monroe co., one acre 88 bushels and 11 lbs. The rules of the Society requiring not less than two acres, no premium can be awarded; but the crops are worthy of attention.

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Barley.

E. M. Bradley, Ontario county, 50½ bushels per acre, $15.
E. R. Dix, Vernon, Oneida, 48 bushels, 28 lbs., $10.
Benjamin Enos, De Ruyter, 47 bushels, $5.

Oats.

Peter Crispel, jun., Hurley, Ulster county, 85 bushels, 20 quarts per acre, $15.
E. M. Bradley, Ontario county, 75 bushels, $10.

Buckwheat.

Robert Eells, Westmoreland, Oneida county, 33 bushels, 22 lbs. per acre, $10.
William Baker, Lima, Livingston county, 29 bushels, 14 lbs., $3.

Peas.

E. S. Salisbury, Jefferson county, 27 bushels, 20 lbs. per acre, $10.
Rapalje & Briggs, Rochester, exhibited samples of very choice Peas, viz: Early Kent, Baird's Early Prolific, Nonpariel, &c., Trans.

Potatoes—For Table Use.

H. B. Bartlet, Paris, Oneida county, (Carter variety,) 252 bushels per acre, $15.
C. W. Eells, Kirkland, Oneida county, 246¼ bushels, $10.
Nelson Van Ness, Chautauque county, 218¼ bushels, $5.
Aaron Killam, Mexico, Oswego county, 13 varieties of potatoes of remarkably fine appearance, raised from seed, with full description of the manner of cultivation, $10.

Potatoes for Feeding.

Martin Springer, Rensselaer county, 316 bushels per acre, $15.
John S. Gould, Albany, Cocoanut Squash and Cauliflowers, $3.

Ruta Bagas.

Joseph Hastings, Rensselaer county, 984 bushels per acre, $10.

Carrots.

E. Risley & Co., Fredonia, 941 bushels, half acre, $8.
Same, 664 bushels, half acre, $6.
L. B. Langworthy, Rochester, 574 bushels, half acre, $4.

Fruits—Apples.

J. C. Hubbard, Troy, Michigan, Trans. and Fruit Culturist.
L. P. Grosvenor, Pomfret, Ct., Trans. and Downing.
R. H. Brown, Greece, Monroe, Trans.
J. H. Watts, Rochester, Trans.
J. D. Campbell, do., Fruit Culturist.
E. P. Prentice, Albany, Downing.
H. A. Underhill, Macedon, Trans.
R. G. Pardee, Palmyra, Downing.
Hiram Foster, Apples, do.
Dr. Herman Wendell, Albany, Pears and Apples, Downing.

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J. W. Bailey, Plattsburgh, Apples, Trans.
B. Hodge, Buffalo, Trans.
S. Morgan, Albany, Fruit Culturist.
Chas. Ross, Washington county, Trans.
Ellwanger & Barry, Rochester, Trans.
William Rogers, Williamson, Wayne county, Downing.
Dennis Clark, Trans.
Robert Patterson, Perry, Wyoming county, Fruit Culturist.
J. J. Viele, Troy, Fruit Culturist.
Pears.—Hon. S. Miller, Rochester, Fruit Culturist.
Grapes.—R. G. Pardee, Palmyra, Downing.
„ —Joseph Cary, Albany, Fruit Culturist.

Resolved, That the thanks of the Society be tendered to the contributors to the exhibition of fruits.

The President, Hon. John A. King, then delivered his annual address, which was listened to by a very large audience with manifest attention.

ADDRESS.

Gentlemen of the Agricultural Society:

Another year has run its course since we were assembled in this hall; a year of prosperity, of peace, and of general advancement in all that relates to the power, resources and intelligence of a free and contented people. Yet for a brief space their cup of happiness was mingled with bitterness, and the bright hopes and buoyant health of a whole people were checked and enfeebled by the pestilence which walked unseen among them. But the Almighty power, whose wisdom and dispensations may not by man be questioned, having permitted this scourge of nations to ravage for a time our land, by the exercise of the same inscrutable will, as suddenly caused its fearful progress to be stayed; when, with returning health, from every part of this broad land, the thanksgivings of a humbled but grateful people arose to Heaven. The elastic springs of industry, no longer weakened by the common calamity, were soon braced, and became equal to the new and general movement which imparted fresh vigor to enterprise and labor.

Among the remarkable events which have distinguished the present year, and one which will leave its trace for years to come, is the discovery of the golden sands and placers of California, the true El Dorado of the west. The spirit of adventure and enterprise which it aroused among all classes of our own and other countries, a spirit far more absorbing and intelligent than that which moved all Europe soon after the discovery of this Western Continent; and drawing within its influence the active (young) and ardent of our population, reached the sons of our

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farmers, who, usually slow to yield to the inducements which enlist the feelings of other classes, obeyed in this instance the universal impulse, and rushed with headlong ardor over sea and land in quest of brighter fortunes in a land not flowing with milk and honey, but glittering with gold and silver, and precious stones.

Yet notwithstanding these drafts upon the health and numbers of our people, I think it may be said without contradiction, that at this moment our whole country, and especially the State of New-York, in all her various relations, never was more prosperous, never more contented and happy.

Since our last annual meeting, the cause of Agriculture, which it is our special duty to promote, and render more and more worthy of the attention and care of those most deeply and immediately concerned in its success, has received in various ways the approval of the farmers of this State, and the example of New-York has already awakened the attention and consideration of several of our sister states, towards this great and true source of wealth and independence.

The commissioners appointed by the Governor, under the authority of the Legislature, to mature and report a plan for an Agricultural College and Experimental Farm, have discharged that duty. The subject appears to have been treated by them with great clearness, in sufficient detail, and with a view to a practical result; having reference to the ability of the State, and the great interest to be subserved by the adoption of the plan proposed by them. I will briefly advert to some of the views presented in their report, as not only pertinent to the occasion, but as furnishing the reasons why the State of New-York should take the lead in the establishment of an Agricultural College and Farm. The broad, and I had almost said, the national foundation—for in their use and influence, they are such—upon which the public improvements of this State repose, indicates a policy and forecast, which wisely, and in time, placed the State, in all its varied interests, first among those which, striving to secure the commerce of the west, looked also, steadily, to the improvement of her people, and to the development of all her resources.

The tendencies of the present age are eminently practical. In the manufacturing and mechanic arts, by the aid of science and learning, a greater advance has been made in the last century, in the various departments of industry, than in the ages which preceded it. In consequence of this marked improvement in these kindred *arts*, Agriculture has of late demanded and received a share of the public attention; and in our own State, a liberal appropriation from the treasury

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has raised the pride and stimulated the exertions of our farmers. Great as is the interest of New-York in commerce and manufactures, and worthy as they are of all her care and protection, still she must ever feel, that her chief interest is in the cultivation of her broad and fertile lands. In other words, that Agriculture is, and ever must be, the great source of her wealth, and the sure support of her increasing numbers. That as Agriculture employs double the number of those engaged in all the other branches of industry, so the capital invested in and applied to the cultivation of the soil, is supposed to have a like preponderancy: And hence, that farmers, as a class, are entitled to a particularly favorable consideration, because, by a misdirection of labor in that pursuit, a great national loss must be annually incurred.

There is not however according to the report of the commissioners, any institution in the U. S. which in all its details, resembles that required by the resolution of the Legislature. Those in Europe, although offering many useful suggestions, are not entirely applicable to the state of Agriculture in this country. Our mode of farming, differs from that of Europe. The rate of wages is higher, while a greater annual profit is looked for, than in the old world. Among the most obvious deficiencies on the part of the farmer, is an accurate and precise knowledge of the soil he cultivates, and of the manures and rotation of crops best adapted to its improvement and returns. A practical knowledge of Geology and Chemistry, will enable him to discover the character of the soil, and the quantity and quality of the manures, which are best adapted to restore its fertility. In short, that a new stimulus will be given to the farming interest, and emulation directed by science, must steadily press forward in the improvement of an art which is honored and fostered by the State. In order to carry out these views, the commissioners recommend the establishment of an Agricultural College and Experimental Farm, and that the necessary appropriations shall be made for that purpose. I most cheerfully add my concurrence to the general views presented in their report, which is distinguished for the ability with which it has presented the subject for the consideration of the Legislature; and which addresses itself, as well to the scientific and practical improvement of our whole system of Agriculture, as to the ability and comprehensive policy of the State; and I am gratified to perceive that the Governor in his late message has given his approval and sanction to the recommendations of the commissioners, for the establishment and endowment of these institutions, devoted to Agriculture and its practical and scientific improvement, upon a wide and comprehensive foundation.

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In connexion with these proposed institutions, it would be highly desirable and important that an agricultural survey of each of the counties should be made. If conducted with a view to the great object desired—the condition of each, as to the system of agricultural pursuit, the character of its soil, its capacity for improvement, and the manures best adapted to its crops and tillage, would be ascertained with such other information as its Geology and mineral wealth might afford. It would furnish the best account of the Agriculture of the State; and the evidences of its great capacity for more enlarged and profitable improvement. It has also been suggested that the diffusion of agricultural information, especially in our schools, would give the earliest, and frequently the best and most lasting impressions in favor of the farmer's life and occupation. I understand that an Essay by Professor Norton, for agricultural schools, has been approved by the committee and the Society, under an offer of $100 for a work of that kind; which from the acknowledged ability of the author, will probably be the commencement of a series of works beneficial to the agricultural interests of the country. While thus at home it will be seen, we have not been unmindful of the interest in the land, and of those who cultivate it, other States have begun to turn their attention also, in the same direction; and among those which have moved with a purpose of arriving at the most enlarged and practical results upon this great and general interest, the States of Massachusetts and Vermont stand among the foremost. In Massachusetts, a most princely endowment for an Agricultural College in that State has been made by the will of the late Mr. Bussy; upon the death of the present possessors, his large estate of $400,000, is bequeathed to Harvard University, with a special appropriation of $200,000 for an Agricultural College and Experimental Farm at Brookline; thus securing at no distant day the establishment of a college upon a footing that promises the most satisfactory results. In Vermont, a joint committee was raised by its Legislature, during the last session, to inquire into the expediency of recommending the establishment of a Bureau of Agriculture in the department of the Interior, at Washington; and a very able report was submitted by them, to both branches of the Legislature, in which they earnestly recommend that a Bureau of Agriculture should be established at Washington, whose province it should be to superintend and promote the great cause of Agricultural improvement in the nation, and conclude their report with a resolution to that effect, and with a request to the Governor of the State to transmit the same to the President of the United States, and to the public authorities of the several States, to the end that the attention of Congress and the State Legislatures, might be properly invited to the proposition

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embraced in the resolutions. In presenting their report, the committee have entered at some length into the reasons which have irresistibly led them, as belonging to one of the old States of the Union, to the conclusions which they have presented; and as many, if not all of them, apply with as much, if not greater force, to our own State, I will allude to some of them particularly, as they seem to me to be the result of sound and practical observation upon the present state and condition of Agriculture in the older States; and as indicating generally the true system of improvement, which must be thoroughly and steadfastly pursued, in order to restore the fertility of our soil, and the character and amount of our various productions. Washington, as practical as he was wise and good, recommended, at an early day, a Home Department of Agriculture, and in reference to that subject, said:

"It could not be doubted, that with reference either to individual or national welfare, Agriculture was of primary importance. In proportion as nations advance in population, and other circumstances of maturity, this truth becomes more apparent, and renders the cultivation of the soil more and more an object of public patronage. Institutions for promoting it, grow up, supported by the public purse; and to what object can it be dedicated with greater propriety? Among the means which have been employed to this end, none have been attended with greater success than the establishment of Boards, composed of proper persons, charged with collecting and distributing information, and enabled by premiums to encourage and assist a spirit of discovery and improvement, by stimulating to enterprise and experiment, and by drawing to a *common centre* the results every where of individual skill and observation, and by spreading them thence over the whole nation. Experience has accordingly shown that they are very cheap instruments of immense national benefits."

The committee remark, that the system of Agriculture pursued by our fathers, in a new country, with a virgin soil, and a sparse population, was necessarily perhaps, rude and improvident; but that the improvements in tillage, have not advanced with the rapid increase of numbers. That the soil in the older States, has become greatly impoverished, by the system of husbandry, which has been so long pursued, and that insects, blights, and noxious weeds, the usual attendants of imperfect tillage, have increased, and multiplied to an alarming extent. The same process of exhaustion, which has marked the Agriculture of the Atlantic States, is now going on in the West. Although nature has, by a long and most liberal process, enriched the lands of that section, with a fertility elsewhere unknown, still, they can be impoverished and worn

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out, by the hand of man. While this system of Agriculture, destructive of fertility, has been pursued among us, several of the States of Europe have been rapidly advancing in productiveness. There, Agriculture is fostered and cherished by government. Lands, which have been cultivated for ages, have, within sixty or seventy years, by a judicious rotation of crops, and a system of manuring adapted to the soil, and the crops, been made to yield three fold. Vast tracts of wet lands have been drained, and are now under profitable cultivation; Agricultural schools and colleges, have been established, and the breeding of animals has been carried in England and Scotland, to the highest perfection. If the state of things in this country, will not warrant this high cultivation to the extent it is now carried in those two countries, we are nevertheless warranted in the employment of far more enlightened and correct principles of tillage than are now in common use. It has been said that a prosperous agricultural country, is not without patriots to defend it. And it is undeniably true, that a high state of intelligence and scientific knowledge among our farmers, would ensure more certainly, than any thing else, the perpetuity of our Republic, and the full development of its agricultutural capabilities. I concur with the Vermont report, in the opinion, "that an improved sentiment is becoming prevalent, that Agriculture is of primary importance; that our nation has already advanced in population, and other circumstances, to maturity, to that position, which renders the cultivation of the soil, an object of public patronage, and that there is no object to which it can be dedicated with more propriety."

The President of the U. S., in aid of these views, has, in his recent Message to Congress, lent the influence of his high position to place the cause of Agriculture favorably before the Representatives of the whole people. Referring to the fact that no direct aid had been given by the general government to the improvement of agricultural knowledge—except by the expenditure of small sums for the collection and publication of agricultural statistics, and for some chemical analyses, which have been paid for out of the Patent Fund—"he states that, in his opinion, this aid is inadequate to give to this leading branch of American industry the encouragement which it merits. He recommends the establishment of an Agricultural Bureau, to be connected with the Department of the Interior; and declares that it should be the study of every statesman to elevate the social condition of the agriculturist, to increase his prosperity, and to extend his means of usefulness to his country, by multiplying his sources of information."

To show what England and Scotland have done, since 1688, towards the enclosure and cultivation of their waste and forest lands, and the im-

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provement of their system of Agriculture, which their increasing numbers, enlarged commerce, and the establishment of their great and varied manufactures have rendered necessary and profitable, and as indicating the course which, ere long, the farmers of this State will be called upon to adopt—so rapid is the increase of our population, swollen as it yearly is by the vast number of emigrants from all the nations of Europe—it is with reference to this view of the subject, the more perfect and systematic cultivation of the soil, that I desire to show, a little more in detail, what has been the result of a more enlarged and practical, because founded upon more accurate and scientific information on the system of husbandry and drainage, which has distinguished both England and Scotland during the last sixty or seventy years; and I cannot avail myself of higher or more recent authority for what I shall state in connection with this view of the subject, than the luminous pages of Macauly's History. In 1685, long after the settlement of several of the colonies on this western continent, England contained about five and a half millions of inhabitants. Her revenue was small, compared with that of other countries, being three-fourths of that of Holland, and one-fifth of that of France. At that period, the produce of her soil far exceeded the value of all her other fruits of industry; yet Agriculture was then in a very rude state; the arable and pasture lands not amounting to more than one-half the area of the kingdom. The remainder was moor, forest, and fen. The area enclosed since George the second came to the throne would embrace 10,000 square miles; and one-fourth of England has, in his opinion, in the course of little more than a century, been turned from a wild into a garden. To this day, no effectual steps have been taken by public authority to obtain accurate accounts of the produce of the English soil.

In 1696, according to Gregory King's computation, the whole quantity of grain of all sorts grown in the kingdom, was 10,000,000 of quarters, or eighty millions of bushels. Now, 30,000,000 are annually grown; of which wheat alone, would be deemed a poor crop, if under 12,000,000 of quarters. The rotation of crops was at that time imperfectly understood. It was known that turnips, then lately introduced, would afford good winter nutriment to cattle; but it was not then the practice to feed them, and great numbers were killed and salted at the beginning of cold weather. The sheep and ox were diminutive, compared with those of these times. Neither the modern dray horse, nor racer were then known. The rent of land, on an average, has quadrupled; and the first turnpike acts were passed soon after the Restoration. The wages of labor afford the best criterion of the state and condition of the people In the 17th century, 4 shillings sterling a week

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was the fair wages: the average now, has doubled, and in some districts trebled in amount.

As the most important portion, and property of every country is the land, so the most valuab.e and productive art and labor in every country, are those applicable to Agriculture, or the cultivation of the soil: and hence, it should be the great object of our care, because it is the broad foundation of every other establishment. Roads and canals facilitate Agriculture, and are most important aids to the farmer in enabling him to transport his surplus to a ready market. The great object is the surplus, after paying the annual expense. That expense must be paid at all events, and in the common mode of cultivattion, absorbs nearly the whole crop. A slight increase of expense for manure or labor, will greatly increase the surplus and reward the farmer. It is sometimes difficult to induce those who cultivate the soil, to believe in this experiment. Our labor-saving machines are doing much towards this result; and the Societies, by their recommendation, are increasing their use. There is, however, a labor-saving machine which ought to be noticed, and to which a true friend of Agriculture has requested that I would direct your attention: I refer to common and farm roads. He thinks that the saving here, may be so much increased, as ultimately to make the farmers rich. Their productions which are bulky, have to be moved, before they are placed at the disposal of the merchant, an average of twelve miles. On a farm of one hundred acres, taking hay, corn, wheat and potatoes, &c., there will be nearly fifty tons to be transported. Upon roads as they now are, 1,200 lbs. is a good load; upon plank roads, three or four times that weight can be safely carried: making a saving of twenty-five per cent in the cost of taking a crop to market, besides a saving in time and wear and tear of wagon, teams, harness, &c.

In pursuing the subject of a more perfect tillage, Egypt, perhaps, affords the highest proof of what the land is capable of producing for successive ages, when carefully cultivated. It is stated by Gibbon, that the annual powers of vegetation in the fertile valley of the Nile, instead of being exhausted by two thousand harvests, were renewed and invigorated by skilful husbandry, rich manures, and seasonable repose. From the form and shape of the plow of antiquity, it would appear that tillage was invented and pursued by those nations which inhabited a light loose soil. It was easily turned, and the plow of that day would do the work. Strong and compact soils require to be deeply stirred and thoroughly separated to produce fertility. By this means alone, can they be penetrated by the action of the sun, and receive the impression of the atmosphere. Hence the different form of plows.

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In reference to the rich earths and marl deposites of this State, I have recently seen a statement by a person of great energy in whatever relates to the good of his fellow men, and of great accuracy in matters of fact, which declares that there is enough to spare of the rich black alluvial earth, and white marl deposites of the great level bordering the Erie canal, which lies a distance of 100 miles west of Utica, to enrich every acre of poor land in the State, and that it can be transported on the Erie canal, and to Long Island, for $2 per ton, equal to three carmen's loads of leached ashes, at $1.50 per load, on the shores of the island. If this statement is correct, what ample means at home are within the reach of our farmers for carrying out the improved system of husbandry which is already forced upon them, in order to renew the fertility of their lands, and to meet and supply the new and constant demands which increasing numbers and a ready market must ever require at their hands.

The annual Fair and Cattle Show of this Society was held at Syracuse in the month of September last. In comparing it with those which preceded it, it was generally conceded that in point of numbers, in the variety and quality of the animals, machinery, implements of husbandry, fabrics of various kinds, as well as in the productions of the soil, it was the most successful meeting that had yet taken place. The grounds selected for the occasion were about a mile from Syracuse, of an elevated and undulating surface, and improved to great advantage by the citizens of that place, who spared neither money nor labor in the erection of the necessary buildings, and in the general arrangement for the accommodation of the exhibitors, and the success of this great annual gathering of the farmers of the State. The weather was clear and temperate, and from the beginning to the end of the three days, no incident occurred to mar the general pleasure and satisfaction. Order and moderation prevailed throughout, and among 60 or 70,000 persons who were at one time on the ground, not a single instance of irregularity or misconduct was observed. It was truly a noble spectacle, an occasion ever to be remembered in honor of the farmers of this State. It was such an assemblage as can alone be seen among an intelligent and educated people.

Many distinguished persons were present from our own and other States, adding their testimony to the value of these annual exhibitions, and in their salutary influence in behalf of Agriculture. The President of the United States had accepted the invitation of the Society to be present on this occasion; but the state of his health compelled him, most reluctantly at the last moment, to excuse himself from attending, and I am authorised to say that, his inability to be with us was a source of

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sincere regret and disappointment to him, as I am quite sure it was, to the Society and to the assembled farmers of the State.

The address was delivered by Prof. Johnston of England, to a very large and attentive audience. It was written with a scholar's taste, and well and distinctly delivered. Upon our invitation he left the fertile shores of England to visit these distant lands, and to be present with us on that occasion. Among those who have written upon the subject of Agriculture, and considered and applied the aid of science and accurate investigation, to its full and practical development, no one stands forth more prominently, as an agricultural writer, than Professor Johnston—no one, whose lectures have been more generally, and more advantageously read and studied, and whose presence among us at this moment, is hailed with so much pleasure, and whose lectures have imparted so clear an insight into the connexion of Chemistry and its kindred sciences with Agriculture in all its relations. It is by the interchange of what each can impart to the other, and by the presence of men of science and learning from either shore, that the mutual interests and generous rivalry of a kindred people, can be constantly renewed and kept up—and the progress of science, the diffusion of knowledge and the arts of peace, be effectually cherished and maintained. Honor and respect, then, to the man of science, come he from where he may, he is the common and welcome friend, wherever liberty and intelligence have their resting place.

In the month of October, the Secretary of the Society and myself attended by invitation the Maryland State Agricultural Fair, held at Baltimore, where we were received with the kindness and hospitality which distinguish its citizens. It was the second meeting and fair of the Society. The exhibition of stock, and particularly of milch cows, was large and of the best breeds in the country. The oxen were well matched and broken, and the display of sheep such as to command the general approval. The show of agricultural implements was also highly respectable, and the proceedings of the meeting were closed by an eloquent and finished address from the Hon. James A. Pearce. During our stay in Baltimore, we were present at a meeting of the Society, and were admitted among its honorary members. A tribute of respect to the State we represented, and of personal favor for which we made our acknowledgments. An application will be made by the Society to the Maryland Legislature for aid in the great cause which they have engaged. And I may say that the example of New-York, and the proceedings of our Society are relied upon as the best authority for the establishment of their associate upon a sure and liberal foundation.

Since we last met here we have to deplore the loss of one of our earliest, best and most useful members, Col. Edmund Kirby, well known and belov-

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edby us all; a citizen of clear and independent character; faultless in all the relations of private life; a soldier of approved valor; an officer in every public trust, of decision and integrity; an agriculturist whose example and devotion to the cause in which we are engaged, made him doubly dear to us all, died in August last, as he had lived, an honest and a good man.

In conclusion I would say that as the subject of Agriculture generally, has been so well and so variously treated by those who have preceded me, I have thought it best to confine my remarks principally to the necessity which will soon, if it does not already exist in this State, for a more thorough, careful and scientific system of husbandry, which, while it will, from the great facilities for reaching a market, afforded by our roads, canals, rivers and noble sea port, richly compensate the industrious and intelligent farmer, will, at the same time, hold out the best and surest inducement to the son to cling to the home of his chilhood; leaving the far distant west to be sought by those whose lands are less fertile, and whose facilities for transportation less numerous and improved. I am enabled to state, for the information of the Society, that agreeably to the statements of accounts for the past year, we now have in the treasury, after the payment of all expenses, the sum of $2,000; affording the best evidence, not only of the increasing interest which is felt and made manifest in all that concerns the land and its improvement, but also, if I may be allowed to add, of the prudence and economy with which the disbursements of the Society have been made during the past year. With my best thanks for the attention with which you have honored me, and my warmest wishes for the success and steady improvement of Agriculture, in all its branches and kindred associations, I now beg leave to present to you my successor, E. P. Prentice, of Albany, long one of our associates, and distinguished for his devotion to the cause of Agriculture, in all its branches, and for his practical knowledge and skill in the cultivation of the soil, and the breeding of those animals most useful to the farmer and for the market.

At the close of the President's Address, E. P. Prentice, Esq., the newly elected president, responded to the Society in an appropriate manner, for the honor conferred upon him in selecting him as their presiding officer.

On motion of Hon. J. P. Beekman, the thanks of the Society were tendered to Mr. King for the able and instructive address which he had delivered, and a copy of the same was desired for publication in the Transactions of the Society.

A vote of thanks was, on like motion, tendered to the officers of the Society for the satisfactory discharge of their appropriate duties the past year.

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The Secretary, Mr. Johnson, on behalf of Sanford Howard, Esq., then offered the following resolutions, which were adopted:

Resolved, That the members of this society cherish with deep respect the memory of the late Henry Colman—a gentleman long and well known for his active zeal in the cause of agricultural improvement, and especially for the many interesting and instructive effusions of his pen on the various branches of rural economy.

Resolved, That we sincerely sympathise with the family of Mr. Colman in the painful bereavement they have sustained, and that the Secretary forward to them a copy of these resolutions.

On motion of Hon. S. Cheever,

Resolved, That the thanks of this Society be tendered to Professor Johnston, for coming here from his own country, at so much personal sacrifice, to deliver the address at our late Annual Fair at Syracuse, and also to give us the lectures which are now in the course of delivery, to all of which we have listened with the highest interest, which are so deeply fraught with entertainment and instruction, and so eminently tending to awaken the public mind to the importance of more intellecal improvement and scientific research, as connected with agricultural pursuits.

Mr. Johnson, on behalf of Mr. Vail, read the report of the committee appointed to examine the Treasurer's accounts—that the same were in all respects correct.

During the meeting of the Society, the following valuable additions were made to the museum and library of the Society:

N. Starbuck & Son, of Troy, deposited the Peekskill plow, got up at great expense and with very fine taste. This plow received the first premium of the Society, at Saratoga, in 1847, and is attracting much attention from the visiters at the rooms.

J. T. Grant, of Rensselaer county, presented a beautifully executed model of his fanning mill, to which the first premiums of this Society, as well as others, have repeatedly been awarded.

Mons. Alex. Vattemare, agent for International Exchanges, presented a very valuable collection of works to the library of the Society, from the Royal Horticultural Society of Paris; the National and Central Agricultural Society of Paris; Count de Gourcy's Agricultural Tours in Belgium and France in 1849, and in England and Scotland; and works from several authors on subjects interesting to agriculturists.

B. P. JOHNSON, *Secretary.*

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MEETING OF THE EXECUTIVE COMMITTEE.

January 18*th*.

Present, E. P. Prentice, *President*.

A. Stevens, L. G. Morris, A. Van Bergen, J. B. Burnet, E. C. Frost, N. Van Ness, *Vice Presidents*. John A. King, J. M. Sherwood, J. B. Beekman, George Vail, *Ex-Presidents*. B. P. Johnson, J. McD. M'Intyre, *Secretaries*. Luther Tucker, *Treasurer*. B. B. Kirtland, Alexander Thompson, M. D., Herman Wendell, M. D., Henry Wager, *Executive Committee*.

Application having been made on behalf of the citizens of Albany for the next Fair of the Society to be held at or near the city,

On motion of Col. J. M. Sherwood,

Resolved, That the next Annual Fair of the Society be held on the 3d, 4th, 5th and 6th of September next.

Resolved, That the Fair be held at or near the city of Albany, on condition that the citizens of Albany, on or before the second Thursday of February next, present to the Executive Committee a valid bond, conditioned that the Society shall not be charged with any of the local expenses of the Show, and that the arrangements of the grounds, erection of the buildings, clerks, police, forage, refreshments, and incidental expenses attending the Fair, shall all be prepared and furnished as required by the Executive Committee; and that an agreement of the keepers of the public houses be furnished, that they will entertain the public during the week of the Show at their usual rates, to be specified by each.

The premium list for 1850 was taken up and adopted.

The resolution of J. P. Beekman, that the Executive Committee cause to be published one thousand copies of Prof. Norton's essay, to be awarded as premiums, was taken up and adopted.

Analysis of Soils, Manures, &c.

A laboratory has been established, and Mr. J. H. Salisbury, chemist, has taken charge of the same, for the purpose of affording a more ready means of obtaining analyses of soils, peat, rocks, manures, &c. In order to render the laboratory more accessible to farmers, the follow-

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ing rates of charges have been approved of by the Executive Committee:

1. Complete quantative analysis of a soil,..... $5
2. Complete inorganic analysis of manures, marls and peat,.. 5
3. Proximate organic analysis of manures,..... 5
4. Analysis for obtaining one ingredient,..... 1
5. For information on any particular subject,..... 1

The above fees to accompany all samples or communications, which may be directed to the Secretary of the Society.

For analysis, from ½ to 1 lb. of material will be sufficient.

After the transaction of the ordinary monthly business of the Society, the Committee adjourned.

B. P. JOHNSON,
Secretary.

LECTURES BY PROF. JAMES F. W. JOHNSTON, F. R. S., S. L. AND E.

On the General Relations of Science to Practical Agriculture.

Prof. Johnston, on the invitation of the Society, visited this country, and made his first appearance before an American audience, at the Annual Fair at Syracuse. The impressions which were made by his admirable address delivered on that occasion, were in the highest degree gratifying, and but increased the desire to listen to the course of lectures which he had engaged to deliver during the winter. The lectures were delivered before the Society, members of the Legislature, Professors and students of the Normal School and Medical College, and a large number of gentlemen of the city and vicinity, in the Assembly Chamber, which was kindly tendered for that purpose. To say that the lectures equalled not only, but even exceeded the expectations which had been formed of them, would but express the united opinion of all who heard them. Their practical adaptation to the business of the farmer, secured the attention and confidence of every practical farmer who listened to them: and we shall be greatly mistaken, if the perusal of them does not secure equal confidence on the part of the farmers of our country.

The lectures are from a report made by SHERMAN CROSWELL, Esq., which are given with great accuracy, considering the rapidity with which Prof. J. spoke. They were received with strong marks of approbation, during their delivery; and at the close, on motion of the Hon. J. P. Beekman, resolutions of approval were unanimously adopted.

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LECTURE FIRST.

THE RELATIONS OF PHYSICAL GEOGRAPHY TO PRACTICAL AGRICULTURE.

GENTLEMEN OF THE NEW-YORK STATE AGRICULTURAL SOCIETY: I take this, the first public opportunity which has presented itself to me, to thank you for the very kind attentions received at your hands at Syracuse, and I take the liberty of craving from you, for the series of lectures I am now about to commence, the same indulgent forbearance which you shewed towards the address delivered to you on that occasion. The general object of these lectures is to give you a brief sketch of the relations, the general relations of natural science to rural economy.

It will be impossible for me to fill up a single one of the numerous outlines I shall have occasion to present to you. My purpose will be to impress on you the great breadth of existing knowledge which bears on the farmer's art. And first, to show the character, the true practical position which his own art occupies among human pursuits. And in the second place, to satisfy men engaged in other occupations, that whatever farmers, as a class, may be, in any country, at any time, they ought not, either for their own individual interest or for the interest of the country to which they belong, to be less intelligent, or less instructed in general and special knowledge, than other classes of the community are.

Such a course of lectures is likely to be useful at the present time; in the first place, because of the position which according to my judgment practical agriculture now occupies in this State; and secondly, because of the measures which the State Legislature, during the present session, are likely to take—I hope will take in order to improve that condition.

I shall also make it one of my objects to show you that natural science has not only a direct money bearing on the pockets and property of the

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farmer, but opens up also large views of the natural capabilities of countries, and of the relations of these capabilities to the comfort and welfare of man; which are not only interesting in themselves, but such as belong to statesmen to become familiar with.

I have on many occasions, in various countries, and in different ways, endeavored to illustrate the very numerous relations which natural science bears to the art of agriculture. It is impossible for any man thoroughly to comprehend all branches of natural science, so as to be able completely to exhibit these relations in all their details. I do not profess such knowledge, and if I did, time would fail me in the endeavor to lay such details before you. I shall therefore select only a few points for illustration—a few points from the broad branches of natural knowledge enumerated in the syllabus already placed in your hands.

The first of these branches, the one I am to present before you this evening, comprehends the relations of *physical geography* to practical agriculture.

Physical geography is intimately connected with physical astronomy, and if time permitted me to discuss the relations of all science to this important art, I might enter on this branch before discussing the subject of physical geography. But the relations which the great phenomena of Astronomy bear to the art of Agriculture, in so far as the seasons—as the alterations of day and night in different seasons of the year, and the modifications of those seasons which similar latitudes are subject to, at various periods of the year—all these are so familiar to you, that I need only to draw your attention to them to convince you that a large branch of knowledge exists here, which it is of great importance that the department of Agriculture should be familiar with.

The most important points in the relations of physical geography to Agriculture, to which I beg to draw your attention, are the following:

First. That latitude very much influences the adaptation of the place to the growth of plants. You know, that if you pass from the southern extreme of this large country northward, you pass over different climates, so to speak; you pass over different parts of the earth, the latitude of which differs. As, for instance, in passing from the extreme south towards Maine, you know that you pass from the sugar and cotton-producing country, into the wheat-producing, and from this to the barley and oat-producing country—which description properly represents Maine—and that whatever is true along the sea-board, is true of all the interior portion, and of all America, from the extreme north to the extreme south; that latitude very materially modifies the kind of culture which it is necessary to adopt to make crops grow best.

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On this I need not dwell; but to show you how very small differences in latitude most materially affect the growth of plants and crops, take one single example. The growth of sugar presents this example. According to the results of experience, the sugarcane will thrive where the mean temperature is from 64° to 67° of Fahrenheit. By mean temperature, I mean that which is obtained by averaging the temperature of every day in the year. If this temperature is from 64° to 67° in any given place, there is the place where the sugarcane will thrive. But though the sugarcane may thrive in such a latitude, and may be cultivated with success where the temperature ranges from 67° to 68°, still, it grows most luxuriantly, and yields the largest return at the least cost, where the mean annual temperature ranges from 70° to 77°. All other things being equal, the countries where the highest temperature prevails, are those where the sugarcane can be grown at the least cost, and drive all others out of the market.

The southern part of Spain, near the Straits of Gibraltar, presents the first degree of temperature spoken of. Here the sugarcane will thrive; and here was grown the first sugar that came into market. The northern part of Africa has a temperature of the second grade—67° to 68°, or nearly 70°. There, and in the Azores and the Canary Islands, the sugarcane was cultivated profitably; and there it was cultivated after southern Spain ceased the culture. But in Jamaica, and other neighboring islands and countries, with which all are familiar, and where the temperature is about 77°, there the sugarcane grows most luxuriantly. But Cuba, and the northeastern part of Brazil, possess the most favorable temperature for the growth of the sugarcane. Thus the single circumstance of variety of temperature, depending on latitude, designates the places where the culture of the sugarcane can be carried on most successfully. All other things being the same, the cost of labor, the energy and enterprize of the people, the institutions of the country—all these conditions being equal—these two countries ought to drive every other country out of the sugar market of the world. But these conditions do not exist; and in other countries the energy of their population, and the effect of their institutions, come into play, and they may compete successfully even with those most favored by climate for the culture of sugar.

So much for this branch. But the distribution of land and water, is a most important element in the determination of what crops will grow best in countries having the same latitude. You know that all along the seaboard of any one of these continents the climate differs from that of the interior; and that the climate of the interior of the coun-

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try differs from that of the sea-coast, whether of the Atlantic or Pacific side. So in the interior, bordering on these lakes at the north and west, you know that these bodies of water very much modify the climate. All who live near these lakes, know very well that the climate is very much modified by them, that is to say, that the capability of the land to produce certain crops, is modified by the position it occupies on the borders of these great inland seas. You know further, that the rivers of a country have a great influence, not only on the agricultural profit, but on the agricultural products of a country. Suppose the interior of this country were not intersected by these great rivers. Large rivers, are the great highways to market; and you know how little would be the profit to the farmer, who is distant from market, but for these rivers, though he might raise any quantity of grain.

All this I pass over. But a most important point in physical geography, is the elevation of a place above the level of the sea. In various parts of the world there are great ridges of mountains, all of which you are familiar with, as well as with the high table lands, which are to be found in many localities in Europe and America. All these mountain elevations, table lands, and plains, are characterized from certain circumstances, by peculiar agricultural products, entirely depending on physical conformation. These things are obvious and I pass over them.

But the effect of elevations is felt at a great distance. Two illustrations will suffice, on the first, I do not dwell, I will merely name it. Prof. J. here pointed to the map of Europe—to the North sea—to Holland—to the Rhine, tracing its rise in the mountains of Switzerland, until it empties into the North sea, forming at its mouth, islands or deltas. All of you, he continued, recollect the fact, I shall hereafter advert to, of the peculiar unhealthiness of the deltas there. Now, the character of these islands, and of the low country at the mouth of the Rhine, is determined very much by the nature of the elevations from which the water comes. What has been published of the Natural History of your own State, tells you how much the region through which the water flows, determines its quality, what it holds in solution, and how, when it reaches the sea, this matter is deposited in the form of deltas and islands that occupy the mouths of rivers. This is an illustration of the effect of elevations to modify the character of a country, through which the rivers coming from them flow.

But a more striking illustration is presented in another part of the world. The river Nile rises in Abyssinia, flows through Nubia and Egypt into the Mediterranean. It is remarkable that the countries

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through which the Nile flows, are bounded by deserts. These countries would have formed part of these great deserts, but for the waters of the Nile. This river rises in the Mountains of the Moon, which are covered with snow at their summits. At certain seasons of the year, this snow melts, and swells the Nile to such a degree as to overflow and cover this vast plain, and fertilizes what would otherwise be barren, thus giving to the soil its capability to grow crops, and sustain a population which, in remote times, was very great. It is interesting to remark how, on apparently small things, which have their connection with distinct branches of human knowledge, the comfort and even existence of whole nations is found clearly and distinctly to depend.

Among the most interesting phenomena of physical geography, are the depressions in certain parts of the world, compared with the level of the sea. I have spoken of elevations; but there are parts of the world, below the level of the sea, which notwithstanding, grow crops and nourish a large population.

I draw your attention to the Caspian Sea. This is a large body of water, from the edges of which, start plains in every direction. This body of water is considerably below the level of the Black Sea and the Atlantic. If any circumstance should happen, by which a connection were formed between the Black Sea and the Caspian, the waters of the latter would be raised from sixty to eighty feet; a very great area of country would be submerged, and the borders of that sea greatly enlarged.

But the most remarkable case of this kind is presented in that part of the world with which we are all familiar by name, and that is Palestine. In the interior of this country, is the Dead Sea, into which the river Jordan flows, through certain lakes, among them the Lake Tiberias. The Dead Sea is twelve hundred or thirteen hundred feet below the level of the Mediterranean. The Lake Tiberias is some five hundred feet below the level of that sea. If any circumstance should open a track or canal from the Mediterranean into the valley of the Dead Sea, its waters would rise twelve hundred feet and drown a large portion of the people of that country, with which our oldest and most sacred associations are connected.

I shall have occasion in a subsequent lecture, to draw your attention to the circumstance of their being certain parts of the world in which no rain ever falls, and certain other parts where the quantity of rain is very small. It is because the rain that falls in this country, bordering on the Dead Sea and the Caspian, is no greater than the evaporation, that it remains as now, and has not been submerged long ago. With

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such a climate as you have, and as we have in Great Britain, where the rain that falls is greater than the evaporation, the population of those regions would have been annihilated by the rising waters.

But there are large tracts of country, which are not either above or below the level of the sea; but which are so flat, that the water that falls, remains and stagnates. In this country, large tracts are rendered useless for agricultural purposes, by the extreme evenness of the surface. In New Brunswick, there are large tracts of this character, and which seem to defy all agricultural improvement.

Again, there is a tract of country on the bay of Chaleurs, which though exceedingly flat, is naturally fitted to become as rich as some of the richest lands of Scotland, even those celebrated for their richness. It is so flat, that the water cannot escape. It is not a bog, or a swamp, but so wet that it cannot be cultivated profitably by the settlers.

Besides these phenomena, there are certain natural obstructions, which present themselves, in the course of rivers, and give rise to new conditions of the country bordering on them, which are more or less unfavorable to the growth of crops, but which farmers make profitable. In New Brunswick, there are many such—which may be called bogs, or swamps. In your own State, in Cayuga county, I believe chiefly on the outlet of Cayuga lake, lies the Montezuma Marsh. I have not visited it myself, but am advised, that the marsh is formed by obstructions, which can only be removed by operations on a large scale, by which a partial drainage is effected, and thus the water enabled to flow from the lake, and thus a large extent of land, capable of being made of the most productive character, may be redeemed from barrenness. In other parts of your country, in Georgia, for instance, there are large swamps, and in Florida, there are what are called everglades; in regard to which, I am happy to hear, that steps are talked of for draining and reclaiming.

Another remarkable phenomena, which has attracted the attention of physical geographers, is the large deltas formed at the mouths of great rivers, everywhere. Those at the mouth of the Mississippi, are familiar to you all. You know that these deltas found at the mouths of all great rivers, being formed of rich alluvial soils, are generally of an unhealthy character; unhealthy, because of their richness, and because of that unhealthy character in other situations, and under other circumstances, would not be cultivated at all. If time permitted, I might here show you, how much the agricultural prosperity of a country, not its capability, (for these deltas are capable of the highest degree of produc-

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tion,) but how much agricultural products depend on the healthy character of the climate. Farmers thrive in countries far more cold and severe, than others; because these cold and severe countries are mostly healthy. I am sure the hardy farmers, who cultivate the soil of New Brunswick, though they suffer from the extreme cold of the country, and complain of it, yet certainly enjoy far more happiness, so far as happiness depends on bodily health, than the inhabitants of other richer countries, such as Georgia, the Carolinas, Florida, and other southern States, which are far richer, and produce more, with far less labor. Hence, in all cases, in the temperate and colder climates, rural economy in general, attains a much higher state of improvement, than in the richer and warmer, but less healthy countries.

There is one circumstance, in connection with these deltas, to which I will draw your attention, and only one; that is to say, of the lands at the mouths of rivers, and the character of the banks of the rivers themselves, when they are of great width, and when deposites have formed of alluvial soil, as is the case at the mouth of the Mississippi, and in other parts of the world. It is the character of these deposites to assume a higher elevation at the exterior than the interior part; and from this peculiar conformation—the depression of the interior parts—marshes and bogs, and bogs of peat marsh, in some localities are formed in these depressed portions.

I promised to draw your attention to the Rhine. The Rhine, when it reaches the North of Europe, becomes loaded with mud to a great degree—not so great as the Mississippi; but there is this difference: the Rhine empties itself into a bay, where the waters from the north and south-west meet, and a drawing back takes place, and a precipitation of the earths in suspension goes on at the mouth of the river itself. Now, there was a time when these deposites took place without being heeded; when there were formed islands of small extent, the edges of which being raised above the rest, by the action of the waves and the current, formed strips of land on which trees and plants grew—the external being higher than the internal parts—thus forming a large extent of boggy, muddy, and sandy country, stretching from the mouth of the Rhine, north, to the Zuyder Zee; that is to say, forming the country now called Holland. By degrees, the fishermen settled on these little knolls, and their fertility being soon known, the farmers were attracted thither, and by indomitable perseverance and enterprise, these and the adjacent lands were reclaimed by artificial works, and form what is now the limited provinces of Holland. I will not dwell on the history of this people; but you must see that the character of a people in such a country, formed originally by natural operations, and reduced to a

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habitable region by human perseverance and skill—you must see in the nature of the country, which must have moulded the character of the inhabitants, and formed the national character of its people—something of their remarkable characteristics. If time permitted, I might enter into details illustrative of these—the result of personal observation in that country—going over its dykes, sailing on its canals, and witnessing everywhere the triumphs of human power and art over extraordinary difficulties, in a country which, from the beginning of the Christian era, has been subjected to continually repeated inundation. Records go back through a period of thirteen centuries, during which there have been great inundations, which have broken up dykes, let out canals, overflowed cities, and drowned large numbers of people, once in seven years. For thirteen centuries, the Hollanders have been subjected, on an average once in seven years, to these inundations. I have thought, in going through that country, how many struggles that people have undergone, what perseverance they have displayed, what victories they have achieved over stubborn and apparently indomitable nature, what effect the consciousness of having done all this must have upon individual as well as national character, and what a great triumph it is in itself thus to have fixed themselves firmly on the soil!

Gentlemen, it is useful to us—it carries with it a great moral lesson—to survey such a country as this; teaching us that those who possess great natural advantages, whether as nations or as individuals, are not always either most blessed or happiest; that difficulties bring out the energies of individuals and nations, and that those nations and those individuals are not only happiest, but in general most successful, who have these difficulties to encounter.

I leave this department of the subject. With the subject of rivers are connected the tides. The flowing of rivers is naturally connected with the flowing of tides, and the flowing of tides is a physical phenomenon intimately connected with agricultural prosperity in many parts of the world. I need not go far for an illustration—if I take you to the Bay of Fundy, which separates Nova Scotia from New-Brunswick—the waters of which rush up with great velocity, and rise to a great height. Fifty or sixty feet is no unusual tide at the head waters of the bay. As they rush up, they sweep the banks on either side, which on the Nova Scotia side are composed of a species of rock and clay, and arrive at the extremity of the bay loaded with mud to a very great degree. They are the muddiest waters I ever saw. This mud is deposited at the head waters of the bay, in great quantities, and forms the richest land existing in that part of the world. The richest land in Nova Scotia and New-Brunswick, is formed of such deposites as these—mainly

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from the waters of the Bay of Fundy, which not only bring with them the ingredients that fertilize the soil they form themselves, but bring to the industrious farmer the means to fertilize the upland to a great extent. I do not mean to say that there or in other parts of North America that I have visited, the advantages of these deposites are fully put to use; but still, the means these marshes afford of enriching the uplands is very great, and capable of producing enough to nourish a large population.

But I pass over this also, and I shall take you next to the sea itself, and to the currents that traverse the sea. And here I am able to present one or two interesting illustrations.

Prof. J. pointed out on his map certain shades, indicating the currents of water. Here, said he, (pointing to the coast of Africa near the equator,) the tendency of the water is to flow westward. And here he began with it, tracing the course of what is called the great equatorial current. This current, which is here three or four degrees colder than the water of the main sea, breaks against the northeast corner of South America, and then separates, one portion running to the north and the other to the south. But here, having expended its force it seems to lose itself, but proceeds on till it is taken up to the river Amazon, and flows through the Caribbean sea. Here the water, which before was colder than the surrounding sea, gets warmer, and flows along through the Gulf of Mexico, as if trying to get further west. But it is edged off by the main land, until at last it is obliged to take its way back along the coast of Florida and thence along your sea-board, until it comes opposite the southern part of Newfoundland. When the current comes out of the gulf, it is warm, nine or ten degrees warmer than before. Thence its natural direction is across the north Atlantic, until it strikes the coast of Spain. But it does not all go there; a part of it breaks off and goes north, passing the southeastern coast of Iceland, and then the warm water loses itself in the Arctic sea.

Now, what is the effect of this on the agricultural character of the country which this stream visits? Being nine or ten degrees warmer than the surrounding sea, it retains this warmth to such a degree at the north, that the climate of those northern regions, even as far up as Spitzbergen, is materially mollified by the water thus flowing up from the southern country.

The indications of this, are very distinct in the north of Europe. (Prof. J. here pointed to a map of the globe, across which was affixed a piece of red tape, which followed one of the northern parallels of latitude, or nearly so, saying that it was intended to represent more

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clearly the nature of this modifying influence upon climate and upon agricultural products.) That line, said he, covered by the tape, indicates the line where the ground is frozen all the year round; that is the course of the line of perpetual frost. What is the reason of this bend towards the north? (pointing to the neighborhood of Iceland and Spitzbergen, where the tape was carried several degrees north;) the reason is, that the warm water of this equatorial current, being heated in its passage through the Gulf of Mexico, carries this warmth so far north, that it actually changes the course of this line of perpetual frost, preventing a greater part of Lapland and Norway, and a greater part of Sweden also, from being constantly frozen; but for this, these parts of those countries could not bear crops; and in Norway, and a greater part of Sweden, all of Finland, and a large portion of Northern Russia, it would be perpetually frozen, but for the fact that this stream mollifies the severity of the temperature, and thus enabling this northern country to grow barley, oats, and other things, necessary for the sustenance of man. This physical, geographical phenomenon, connects itself with considerations of the highest moment. It shows you, on how slight a circumstance, which might well escape unobserved, depends the fate of a country, and the lives of millions of men.

Suppose for a moment, that this current in its flow towards the west, in search of an outlet in that direction, could make its way through the Isthmus of Panama, and could go right across the Pacific Ocean, instead of being compelled to take its course north, what would happen? This water would flow straight on, through the Gulf of Mexico, into the Pacific. The Gulf stream would cease to exist at the north, and the climate in the regions spoken of, would cease to be modified by it, and we should have an icy desert, without the capacity to sustain human life, and an uninhabitable region in Norway, Sweden and Northern Russia.

To give you an idea of the quantity of heat diffused by the Gulf Stream, in these northern regions, I may mention that the quantity of heat acquired by this stream, and thus thrown northwardly in its course, is enough to warm the whole column of air, that rests on Great Britain and France, from winter temperature to summer heat; hence, there is every reason to believe that the mollifying influences I speak of, are produced in that way.

Another current called the Arctic current, originates in the masses of ice which surround the North Pole. It runs along the eastern shores of Greenland, to Cape Farewell, doubles the cape, and flows up the western coast of Greenland, to about 66 degrees north latitude, where

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it turns to the southward, along the coast of Labrador, forming the Hudson Bay current. This, being cold water, very materially affects the climate of Newfoundland. In 1831, the harbor of Newfoundland was closed with ice on the 1st of June, though it is two degrees further south than Liverpool. Arriving at the north end of Newfoundland, it sends a branch through the Straits of Bellisle, to the St. Lawrence, while the main part joins the Gulf Stream, between 43 and 47 degrees west longitude; here it divides—one portion flowing south to the Carribbean Sea, which it enters as an under-current, the other flowing south-west forms the United States counter current. Here it serves a useful purpose. It replaces the warm water sent through the Gulf Stream, and mitigates the climate of the countries of Central America and the Gulf of Mexico, which, but for this beautiful and benign system of aqueous circulation, would have the hottest, if not the most pestilential climate in the world. I believe that the climate of the states of North and South Carolina and Georgia, which is salubrious, even in the summer months, is in a great measure the result of the mollifying influence of this cold current, and thus rendered bearable in those parts of the world, which would be otherwise unhealthy if not unendurable. Another illustration:

I said I would show you why this equatorial current was colder when it crossed the Atlantic. I have already given you one reason, that if it flows from a certain point on the African coast, water must flow to that point, either from the north or the south. Let me show you how it comes from the south. Looking at the map of South America, you will observe the Andes, which traverse the whole of South America, are bordered by a fringe of land on the west forming Peru and Chili; these are low countries—bordered by the sea on the one side, and by the mountains on the other. In these countries no rain ever falls—from their position it should be a country in which nothing was to be seen but barren and sandy wastes, where no people could live, and because of the absence of its capacity to produce crops. Now, there flows from the south-west a large body of water, which drifts up towards the coast of Peru and Chili. It is called the great southern drift. As it approaches the coast of Patagonia, it widens and separates into two branches; one flowing towards the south, the other the north. This current is cold water, and is some ten degrees colder than the sea through which it flows. Humboldt was the person who first observed both the temperature and the effect of this current; hence by some it is called the Humboldt current, by others, the Peruvian current. The effect of this current is very remarkable, upon the agricultural capabilities of

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these two countries. You know that rain and mist are caused by the commingling of currents of air of different temperatures. A current of air from the north, meets the southern current, which is warmer and moister, and the mingling of the two, causes the moisture of the air, to be precipitated in the form of fogs and mist, and sometimes to fall in the form of dew. Now the mingling of this warm air, as it passes over this cold current, becomes cooled down. The moment it comes in contact with the current of cold air, it forms a mist, and at certain seasons of the year, a great deal of mist and fog hangs over this whole coast. During the prevalence of these fogs and mists, the atmosphere loses its transparency, and the sun is obscured for months together. The vapors are so thick, that the sun seen through them, with the naked eye, assumes the appearance of the moon's disc ; sometimes as red as blood. This fog is altogether the result of the causes I have mentioned. The effect of these fogs, which cover the whole surface of this coast, to a greater or less extent, and fall in refreshing dews at night, is to cause vegetation to spring up, and flourish, where no rain ever falls, and thus, from these simple, natural causes, this large area, which would otherwise be a desert, is made capable of producing enough to sustain a large population.

In this connection, permit me to draw your attention to another interesting fact. This current combined with the prevailing south-east wind, favors every voyage on this coast from south to north, to such an extent, that one may easily sail in 4 or 5 days, from Callao to Guayaquil, and in 8 or 9 days from Valparaiso to Callao, a distance of more than 1,600 miles. But the same current, flowing north, with the prevailing wind, retards the passage of vessels in the opposite direction. But the last difficulty which arises from the provision made for the sustenance of man, in promoting the growth of that, on which he lives, has been counteracted by human intelligence and skill. The power of steam, or rather its application to the purposes of navigation, conquers this difficulty, and a voyage which it took weeks to accomplish, is now made in the same number of days, and the commerce of this coast, is carried on with great facility.

Another compensation for this difficulty: in order that steam may be employed upon this coast, it is necessary that there should be a supply of fuel; there is such a supply. At Valparaiso there is a large deposite of coal. Thus Providence, which is always kind to us, and which always provides some way in which human ingenuity may overcome obstacles, seems here to have provided the means for overcoming the difficulties to navigation, caused by this cold current, which is so

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necessary to the subsistence and comfort of the inhabitants of that part of the world.

Gentlemen, I might here draw your attention to ancient physical geography; I have spoken of modern physical geography, as it exists now. I might speak of ancient physical geography, as it existed at a very remote period, and show you what currents and drifts existed then, how far they have modified the face of the country, and, in fact, determined not only the capabilities of the soil, but the modes of culture, the crops best fitted to particular localities, the kind of husbandry necessary to their growth. But in this lecture I have trespassed on the time usually allotted to such an address, and therefore I shall not enter on this new subject, but content myself with such illustrations as have been already presented, hoping that the few points which I have put before you, selected from a vast and extended field, will satisfy you that the phenomena of physical geography not only present a vast fund of information of the highest interest, and especially to those whose leading pursuit is Agriculture; but that it does open up very large views of the economy of Providence, which are elevating and improving to the human mind, and which those who have to do with the affairs of nations, above all others, should be familiar with.

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LECTURE SECOND.

THE RELATIONS OF GEOLOGY AND MINERALOGY TO PRACTICAL AGRICULTURE.

GENTLEMEN,—The subject of my lecture this evening is, the *Relations of Geology and Mineralogy to Practical Agriculture.* In addressing such an audience as this on such a subject, I can have no apprehension lest my subject should be either undervalued or too little understood. It is under the encouragement of the Legislature of the State of New-York, that the Silurian system of rocks, which is so largely developed in the western part of this State, has been made classic ground among all geologists and paleontologists throughout the whole world; and there is not in Europe a single lover of this branch of natural science who does not feel grateful to you for the liberal patronage you have bestowed on his favorite pursuit. It is very rare that a work so rich in practical and money benefit to the community, as your series of volumes on the Natural History of the State are sure to be, should be at the same time accompanied by so large a harvest of reputation. My only apprehension, in bringing this subject before you, is, that the skilful and extended labors of your own Hall and Emmons may have already made you so familiar with it as to rob of all novelty anything I may have to offer, and to make my illustrations less interesting than they might otherwise have been. But by drawing my illustrations mainly from my own country, with the Geology of which I am more familiar, I may possibly be able, in some measure, to weather this difficulty.

Gentlemen, Geology occupies itself with the crust of the globe; that is, with all the solid materials which we can get at—that forms the subject of geological investigation. Now, the surface of the earth consists of a series of rocks, that lie generally one over another, like the leaves of a book, forming generally stratified deposites, or rocks lying in beds or strata. The greater part of them, though not now lying perfectly flat, were at one time horizontal, but are now generally inclined a little.

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Professor J. here pointed to a geological section, where the different strata were represented by different colors, and showing their different inclinations; and went on to say that these strata had certain relations to each other—that is, in regard to position, one being generally highest, and the other lowest. Wherever you find these stratified rocks, the same relative position which they have in one part of the world, will hold good all over the globe, unless where, from some extraordinary circumstance, this natural position has been disturbed.

Besides these stratified rocks which form, by far, the largest portion of the crust of the globe, there are rocks unstratified—rocks which do not occur in strata, but which present themselves in large masses, rocks which when broken, are found to be one solid mass, having no strata. There are many stratified rocks, which are known by different names—but those which are unstratified, and which cover a large portion of the surface of the earth, are not so various. One portion of them is called trap-rocks, which is a dark colored rock, and occurs in great quantities; and another is the granite, of which there is an abundance in your own State. All the north-eastern part of the State of New-York, consists of this granite.

So much in regard to the relative position of rocks—for this is quite enough for our purpose. These rocks have generally definite compositions, or definite component parts; by that I mean a composition which in some cases, is very easily ascertained, and in some cases is characteristic of the rock. Prof. J. here pointed to the geological section of the State, and remarked that this red indicates a sand stone; this blue, a limestone, &c. Now, all stratified rocks, those rocks which lie one above another, as represented on this map—all consist of one or other of three things—of clay, or of sandstone more or less hardened; or of limestone, clay, sand and lime, forming all of the great number of stratified rocks occurring on the surface of the globe. But these are not found always, occurring singly; but sometimes we find sand and clay mixed—partaking of the character of both; sometimes lime is found mixed with either clay or sandstone—sometimes all three are found together; so that these three things, clay, sand and lime, either singly or in combination, enter into the composition and form the substance of the stratified bodies of which I have been speaking. Now you will see from this at once, when I make you acquainted with the further fact, that these rocks presenting themselves above the general surface, are more or less ground down, by the action of the ordinary atmospheric causes; the rains, the ice, and other forces that are continually in operation; you will see, I repeat, that, supposing a

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rock to be clay, which is thus ground down, that it will form a peculiar kind of soil—a clay rock will form one kind of soil, and sandstone another, and limestone another, and a mixture of any two of them will form a fourth; a mixture of certain other two, a fifth; and thus you may go on multiplying varieties of soil, from these three kinds of rock, all of them more or less varied, but having the same general character.

Now, practical farmers know very well, that the materials of these different rocks crumbling down, by the action of the causes I have mentioned, will form each a different kind of soil; each of which requires a different kind of husbandry, and each suitable to the production of different crops, varying with the kind of rock that forms the soil. I mean to say, that the husbandry and treatment do not differ in the same degree as the soils; but that because the soils differ, the treatment must differ very much. The clay rocks will give a stiff and moist soil, capable of producing good crops in a hot year; scarcely any in a wet year, but can always be made to produce good crops, when thoroughly drained. The sand stones produce a sandy soil, which is hungry and poor; which will drink up all the water, and eat up all the manure; an easy soil to till, but generally unproductive, except in the hands of a skilful man. Again, if you have limestone rocks, the soil will be not altogether consisting of lime. We have such in England, which is of a rich character, and easily cultivated. Prof. J. here pointed to a geological map of England, on which were represented different kinds of rock or soil by different colors. These colors (he continued) appear in irregular masses, varying as the character of the rock or soil varies, or rather as the edges of the different kind of strata come to the surface. All the stratified rocks being inclined, they present only their edges, as it were, on the surface. If they were horizontal, or nearly so, they would spread over larger, if not the whole surface of the country, and vast tracts would be represented by the same color. But being inclined, the surface is, of course, varied in the character of the soil, and is represented by other irregularities of color. Prof. J. here pointed to a geological map of New-York, presenting to the eye, the similar variations of rock or soil, of which its surface was composed. I was observing, (he continued) that a limestone rock has a soil composed altogether of lime. Such a soil is very rare, but there are some countries where such soils are found. Here, for instance, (pointing to the south-eastern part of England) is a soil composed of chalk only. This is one instance where a soil consists in a great part of limestone, for chalk is a variety of limestone. But if, as is frequently the case, limestones are more or less mixed with sandstone, or with clay ground down, then it

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forms a calcareous or loamy soil; and every farmer knows, who has given any attention to the composition of soils, that this is not only an easy soil to till and to plough, but in general, a fertile soil, and a soil which does not need the peculiar management which sandy soils require to make them fertile, nor the drainage which the clay soils must be subjected to, to make them productive.

Let me illustrate these general characteristics of the soils formed by different kinds of rocks, by a more particular reference to this geological map of England. The geologist has shown that the crust of the globe consists, mostly, of a series of stratified bodies having their peculiar general characteristics, and which occur in a certain order, one above another. The studies and researches of the Agricultural geologist, have shown that soils are generally formed from the materials of the rocks that have crumbled down. By studying such a geological map as this, you may see what rocks exist in different countries, and from the combined observation, made by geologists and agriculturists, it is at once seen, by an inspection of these colors, what are the qualities of the soils.

Here, (said Prof. J., pointing to the easterly part of England,) is a purple tint, representing the edge of one of the stratified rocks which makes its way down south, until it is finally washed by the waters of the sea. This rock, consisting chiefly of clay, forms a tenacious clay-soil, of which there is no example in Scotland. It is so strong that it cannot be cultivated, but has laid in grass for a long time, and there is the finest and most luxuriant grass land in England.

Prof. J. here pointed to a yellow tinted strip of land in the neighborhood of Oxford. There, said he, is a bed of clay 500 feet thick. It is soft, but exceedingly tenacious. It forms a soil, which, when exposed to the sun, in a hot summer's day, hardens so much, that it will ring under the stroke of a hammer, and when wet, is so tenacious that the cattle, which walk over it, can hardly draw their feet out of it. Hence in the county of Huntingdon, where a large portion of the surface is covered with this kind of clay, the soil is so difficult and expensive to work, that though the farmers are, on the whole, pretty well off, they complain that they make little or no profit, and that though in a hot summer, they can grow good crops of wheat, in a wet summer they can raise no crops at all. These stiff soils will not admit of profitable cultivation, naturally, though in hot summers, barley will grow well. Practical men well understand why this is so, when they know that a very short period intervenes between the wet and dry seasons, during which

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it can be brought to the condition in which it is proper to put the seed into it. This makes it exceedingly expensive land to work, and though thorough draining is now bringing in much of this clay formation, still the land, through the whole extent of country covered by it, bears a very low price, and rents for much less than other lands, being so much more difficult to work, from the fact that the work must all be done in a short period of time, and requires a much larger force to do it, and the crops are uncertain.

Now for another kind of rock or soil. I could give you other instances of clay soil. In Scotland there are such instances, and the Scotch farmers have found out a way of cultivating them; but these are not clay soils, of the character of which I have spoken. Hence it is, that Scotch farmers who have emigrated into this clay region of Huntingdon county, have uniformly failed. I was told of an instance, where twenty Scotch farmers had emigrated into that county, and rented land there, every one of whom went to the wall. So very difficult is it, for a man to change his location, and go to a new kind of soil and country, having only the habits and knowledge, which he has acquired in his own country. If he goes into a new country, without knowing the nature of the new soil, which he attempts to cultivate, or the mode of culture best adapted to it—that man is sure to fail; success only goes with knowledge. A man who has a knowledge of the nature of soils, and the true principles of culture, can go upon any kind of soil in any country and meet with success.

But I said I would take you to another kind of soil. There (pointing to the northern part of England,) is a red sand-stone; here is some of it (pointing to the map) in Scotland—this is red sand-stone, known by the name of old red sand stone. This consists of sand, cemented with clay, presenting a red color, and forming a reddish soil, it is in great part sandy. This red rock (pointing again to the map,) represents Wales. In some parts of that country, it is so sandy and hungry, that it drinks up all the water that falls upon it, and eats up all the manure that is put upon it. Of course it cannot be cultivated with profit in the ordinary manner—but properly cultivated, it can be made to yield very large profits. Supposing, as is frequently the case, a hill of sand stone, is found in the neighborhood of a hill of clay, these two when mingled in proper proportions, form a loamy soil, which is exceedingly fertile and easy to work. This combination forms the whole of the valley of Strathmore in Scotland. (Strathmore means great valley.) These soils are exceedingly rich and fertile, when cultivated with

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skill, yielding large profits, both to the landlord and the tenant. To give some idea of the value of this land, I may mention, that this tract, at a period not far distant, paid about £8 an acre of rent; on an average, it now pays £5, and £6 per acre. The farmers who cultivate this land, have become exceedingly skilful, in the working of this kind of land, it is not difficult to plough, it can be early cultivated in the spring, and the fall rains do not come on so early, as to prevent the proper preparations for the winter grain. These men, who cultivate this land, have become so well attached to it, and know so well the value of it, that they have overspread all this red tract in the northern part of England. By which I mean, that they are all men of the same family or blood, and they have extended all over the region where this red land prevails. They have crept further north into Sutherland, and are now going into the Orkney Islands. On this red land, though the climate is far different from that below, far up into that extreme northern region, they are raising crops of wheat, equal to those of more favorable climates. Knowing as they do well, the kind of tillage the land requires, and the general modes of culture, so that all this land, though lying far north, is of as good a character, in all respects, as that I just pointed to, further south. But after all, it is only in cases of necessity, that they go to these cold countries. It is because they can find no better land to cultivate, and when they can find no more land that suits them here, they emigrate to the New World.

Prof. J., here pointed to another tract of clay soil. This, he said, is a colder soil; a marsh, covered with peat bog, lakes, and stagnant water, with here and there, rocks, and here and there, cultivated spots. The inspection of such a map as this, tells me, tells you, if you understand the effect of the character of rocks, or husbandry, the kind of culture best suited to particular localities, and which must be followed, if the land is to be cultivated with profit. It tells me, also, what method is to be adopted to improve it. I know that in such a country, the first thing to be done, is to drain it. Then again, if I find one kind of rock, lying at one particular place, I know that there is another rock of a particular character, lying somewhere about it, either far or near, and that a certain other rock, lies under it, either near or remote. See how this bears on the improvement of such land as this. I find that loam is near it; and this physiology of the country, tells me at once, where to get the materials, with which to improve my land.

It is of great consequence to know more in regard to these soils; to know more than that it consists of sand or lime; to know more than that it consists of clay or sand; it is of great consequence to know whe-

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ther it contains more or less, of one or the other of these substances; for, if a particular soil requires lime to improve it, it is quite clear that the soil is naturally deficient in lime. Now, it is the character of this formation, of which I am speaking, that it is deficient in lime. You have all heard of the forest of Ardennes in the northern part of France. It is full of bogs, marshes and lakes, a most inhospitable tract of land. This is precisely the character of land I have described, and which has this feature particularly, of a great deficiency of lime. Knowing that such is the character of the formation, then I know the nature of the soil and the kind of husbandry best suited to it; and, if there be a farmer living there, whose condition is not one of the poorest kind, then I know how the condition of things has been altered, and how the land has beem improved.

Recollect, I was just stating, that if lime is to be used as an improver, the quantity to be used is a matter of importance; hence, we must know, how much the soil contains, if any, and hence our analyses of the soils must be more rigid, if we would arrive at safe conclusions on this subject. I have here a table, (which the Professor showed to the audience) copied from one of the volumes of Dr. Emmons, representing the composition of the slates and shales of New-York and other places. Among them, I find some soils, which contain a great per centage of lime. The Marcellus slate contains a great deal. This is a very valuable table, but time will not permit me to go into its details. It is quite well to know, if lime is to be applied to the soil, and a certain quantity of lime is necessary to make all soils productive; if that is to be done, it is well to know, before you commence how much lime there is in the land originally.

I do not know that time will permit me to go into this branch of the subject farther. I proceed, therefore, to draw your attention to the unstratified rocks. In England there are very few trap rocks—there is very little in New-York, but in Scotland there is a large extent of it. These trap rocks are the old lava, thrown up by volcanic agencies. These rocks crumble down and form a very good soil. It is a remarkable circumstance, that wherever these trap rocks are met with, in all parts of the world, they, crumbling down readily, make soils of great fertility, capable of fertilizing other fields in their vicinity. Prof. J. here stated an incident illustrative of this fact. He was visiting the farm of a farmer in Scotland, who was actually taking off twelve inches of the surface of one field, consisting of this soil formed of trap, and spreading it over other fields. This expensive operation he found yielded a good return on the outlay.

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Prof. J. here pointed to the north-eastern part of New-York, where the granite occurs. Granite yields a poor soil, which is sandy and hungry, consisting chiefly of gravel and sand, which does not presen great attractions to the farmer, and in the old country is left to be improved and settled when there is no other to cultivate.

Here, said Prof. J., let me take an illustration or two from your own country. You know that a wheat country consists of a soil formed of rocks, represented on the maps by a particular color, chiefly of limestone. He then pointed to another strata, representing a hungry sandstone, then to another, representing the Helderberg limestone. Of all the rocks, this forms the most fertile soil; it is a strong soil, not difficult to work, and retains the water which falls upon it. He then pointed to a clay series of rocks, which do not produce a fertile soil, but when mingled with the sandstones they form a pretty good soil. The limestone, which is in itself a good soil, mixed with clay, forms a great Indian corn growing country.

One point I desire to bring under your notice. I have told you that if a series of rocks be represented by my four fingers, they always occur in a certain order, one above another—here is a sandstone and there a clay; this order is never inverted. This is a matter of very great importance, with reference to the flowing of the water from one end to the other of these strata, because it is obvious that by this means, what is a sandstone at one end may become a clay rock at the other. The Helderbergh series consists of clay and sandstone. Towards the west it is clayey, and towards the east it is silicious; hence the soil is different as you proceed from west to east, so that the geologist not only requires to know the relative position of one rock to another, but whether the rock is liable to these changes in its composition. Hence it is often difficult to determine absolutely, from an inspection of the geological map, the precise quality of the soil in different positions.

One or two other illustrations which the United States present. If you go south into Alabama, and pass from the rich alluvial soil of the sea-islands, over this whole extent of country, from south to north, you find nothing more convincing, from the different qualities of soil and their capabilities of producing different kinds of crops, of the fact, that the geological structure of the country, determines its agricultural products. I must draw your attention, in this connection, to France, which presents another remarkable instance of the relations of Geology to the general fertility of a country. M. Sullin in his "Voyages Agronomiques," has divided France into eight regions, according to their fertility and agricultural productions. Climate, in so extensive a country,

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has no doubt something to do with the fact, that the vine and Indian corn do not flourish in the first of these districts, that of the north; and with the other fact, that the region of the south is also called that of olives. But it is nevertheless remarkable, that this country divides itself naturally into as many geological regions, almost coincident with the agricultural regions of M. Sullin, and thus geology and practical observation are coincident in their results.

Another point will admit of considerable illustration, but I can only spend a moment or two on this head. I have spoken of the composition of soils and the great differences which exist between them; I have spoken of clay as forming one great group of soils. But here is a remarkable distinction. The same kind of material may under different circumstances, present different varieties of soil. If I take this piece of clay, and go into the market, offering a farm for sale, and saying, I have a farm of this kind of clay, the answer would be, we want nothing to do do with your farm; but if I tell a farmer, here is another farm, of this soil, holding a piece of dry clay, he will at once say, I will go and see it. Thus the simple inspection of these two kinds of soil, will tell any practical man, that they are more or less suited to cultivation. In Scotland, we produce magnificent crops on these clay soils. These clay lands, being drained are thus rendered capable of culture, and this depends, not on any new chemical combination, or change, but on the state in which the material exists. It so happens in all parts of the world, that there occur rocks of the same material, which are sometimes harder and sometimes softer; then again there are rocks which are called metamorphic, which have been analysed and found to contain the same elements, and yet are so different in their physical character, that when in one form, they are capable of growing green crops—in the other fitted for wheat. This is an important point and has an intimate connection with the deductions drawn from an inspection of a geological map. I should have liked here to have drawn your attention to the modifications which the action of water has produced on the character of the soil. I showed you in my previous lecture that there were currents in the sea, and how they affected the atmosphere and the agricultural capabilities of various large sections of the globe. But, I did not then speak of the transporting action of these currents. They carry along with them icebergs on their surface, and gravel and sand at the bottom depositing them in various places on their route. And when I remind you that this part of the world (pointing to the northern part of America,) was once below the level of the sea, and that the Arctic current swept over it, with all the rocks and substances with which it

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was charged, spreading them wherever it went, you may well expect that traces of this current may be found on the surface of the globe. This is the case, we find in the Genesee Valley, not only the materials which now form the bottom of Lake Ontario, but we find that these materials essentially modify the soils of this part of the country. It is an interesting and curious fact in the Geology of your State, this Arctic current swept through that valley, and carried the materials which it brought with it over a large surface of country. All this is a matter of interest, because it shows you that a knowledge of these drifts, and of the loose materials which they bring with them is as of much consequence as a knowledge of the rocks themselves. I shall have occasion to revert again to this subject, I pass over it now; I could present, if time permitted, many illustrations of the effects of this current on the agricultural character of other districts.

I have shown you the general application and relations of Geology, to Agriculture, and how the kind of rock determines the quality of the soil, but there occur in these rocks, mineral substances of various kinds. Now a knowledge of these substances, is an essential branch of geological study; if you find in any one rock, that there occurs a certain mineral substance, you have acquired a knowledge of the composition of that rock in every other country. If you find in any one country, in England for instance, what is valuable as an ingredient of the soil, you may well infer that the same thing exists in other countries, in rocks of similar character. One word of explanation; if I light a match, an ordinary lucifer match, a white smoke will be observed; at the end of this match, there is a little phosphorus, that white smoke, is the smoke of the phosphorus, and the substance produced, is phosphoric acid, it is a white solid substance. This phosphoric acid, combines with lime, and forms phosphate of lime. If I take a piece of bone and burn it, it will blaze for a while, and bye-and-bye it will cease to burn, but the part of the bone that is left, is bone-ash, and is white. This bone-ash, as you all know, is phosphate of lime. This phosphate of lime exists in all bones; it is also found in the earth; there are certain geological formations in which it has been lately discovered in considerable quantities. In my subsequent lectures, I shall show you, that this is an important material in the hands of the practical farmer. In the eastern corner of England, there is a rock, called Crag, consisting of sand and shells, among which were found lumps, which when examined, were found to consist of this phosphate of lime. All know that bones are employed as manure; they contain phosphate of lime; now if that be the case, it is obvious that if you can get it in the form of a mineral, and apply it to

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the land, it would be valuable to you. Some farmers are in the habit of employing guano; but this phosphate of lime has been found by experiment, to be equally good; and when I tell you that this phosphate of lime, thus dug out of this formation, had been known to practical manfacturers for years, who had all the machinery for getting it out, and grinding it down, and that they are kept fully employed in preparing it with sulphuric acid, in the form of super-phosphate of lime, you will see that it must be an important material to the farmers. When you learn that the manufacturers are making money by selling this substance to the farmers, who in England, do not throw away their money in experiments, you may be sure, that there is something in it. Now, wherever that rock occurs, it is very probable that that substance is found in it. Professor J., here pointed to a green sand soil, which he said was found in the southern part of England, and was remarkably productive of wheat. All have heard of the marl pits, which exist in this neighborhood, and the materials of which, for hundreds of years, have been dug out to fertilize the land. In this marl are found little nodules, that consist almost altogether of this phosphate of lime; here also, are found bodies of marl, five and six feet thick, containing six per cent. phosphate of lime; knowing this, you have a clue to the fertile character of the soils in this region.

Professor J. here related an anecdote, illustrative of the great fertility of some of the hop lands of Surrey, of the great value of the hop crop, all of which was the result of the application of this fertilizing substance, or of its existence naturally in the soil. This phosphate of lime, he continued, explains this productiveness. Wherever this green-sand comes to the surface, there you may look for these same phosphates, and there you may look for good crops. This green sand occurs in France and Germany, and other European countries. In New-Jersey, in this country, you have a green sand, which belongs to the same class as ours in England.

Now, gentlemen, you see how important the indications of Geology are, in showing where to make selections of lands for farming purposes. If, among your tertiary rocks, you find anything analogous to this sand, you know that you have found a valuable fertilizing material. Then there is another mode in which this phosphate occurs. Limestone occurs in all countries; its qualities are various; some contain animal remains; the bones of animals contain phosphate; therefore it is a matter of great importance to know which of two limestones contains the most phosphate. I shall show you, in a subsequent lecture, the decrease of crops from the absence of this phosphate in the soil, and how, by

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restoring this ingredient, the land may be restored to fertility. In Scotland there is some limestone that has been found, by experience, to be better than others; and it turns out, by experiment, that it is in consequence of the presence of more of this phosphate in one than in the other. I have alluded to the existence of green sands in your country. I learn from Professor Emmons and from Professor Hall, and Professor Logan of Canada, that there are great quantities of this phosphate in different parts of the country; that it exists at Rossie, and that the iron ore of Clinton county contains this phosphate of lime. If it be true that it has been found profitable to buy this phosphate at six and ten pounds sterling per ton, it cannot be unprofitable to inquire whether, in your country, the material cannot be found in quantity enough to bring it within the reach of farmers; and I am happy to find that there are many inquirers in this State who are eager to explore and find out this material which has been found so essential to agricultural improvement. You see, said he, how wide a field this subject opens—you see that the application of physical Geography tells on the pockets of the farmer, and teaches him how he may grow larger crops. This, after all, is the test of the value of science, when applied to the practical affairs of life. Unless you can show the practical farmer—I speak of the farmers of England—that this will tell on his pocket, you will scarcely prevail on him to give it his attention; but when he convinces himself that such and such a process of tillage or manuring will actually enrich him, then he is ready enough to follow your suggestions. I believe that before we get through, you will find that this subject touches, very nearly, the pocket of the farmer.

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LECTURE THIRD.

THE RELATIONS OF BOTANY, VEGETABLE PHYSIOLOGY, AND ZOOLOGY, TO PRACTICAL AGRICULTURE.

GENTLEMEN :—The subject of the lecture for this evening, is the relations of *Botany*, *Vegetable Physiology*, and *Zoology*, to *Practical Agriculture*.

If the other subjects, of which I have treated in the preceding lectures, were far too wide to admit even of a sketch or outline of them in a single lecture, I am sure you will appreciate the necessity, if I crowd into one lecture the three subjects which I am now about to bring before you, of my being even more brief and desultory than heretofore.

First, as to the general relations of Botany. You will bear in mind, that as botany is the science of plants, it must have a close relation to the culture of plants, and as far as these general relations are concerned, they involve the natural relations which all plants have one to another.

The general natural relations of plants are such, for example, as that all the different kinds of corn plants, commonly known as cerealia, and all the grasses, producing seeds of a similar character, possess nutritious properties of a similar kind. The potatoe possesses a nutritive character, different from the corn plant. This, however, is not so important a matter, as it is to know that the entire family to which the potatoe belongs, all possess a similar character; so that, if you know the character of one, you know the character of the whole group of plants. So far as these general relations are concerned, the subject is familiar enough to all, to lead them to conclude that it is one of considerable interest to the practical agriculturist.

Nor shall I enter into a minute analysis of the nature of plants, a province peculiar to the medical man who knows what substances belong to particular plants, and in what plants he is to look for peculiar medicinal properties.

Nor can I do more than bring to your notice the uses of Botany to the art of Horticulture, giving new esculents to the gardener, bringing

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new flowering plants, and new ornamental shrubs into your gardens, and teaching us how to transfer successfully, plants of value and beauty, from the climates in which they naturally grow, and how to realize its importance to arboriculture, a branch which you do not follow as we do in England, because the extent of your natural forests, rather gives you employment enough, in cutting down than in rearing up, but which in many parts of Europe, is an engrossing pursuit, and has led botanists into all parts of the world, in search of new trees; and thus the newly discovered continent has been made to contribute to the beauty of the forests of the old.

Passing over these relations, at which I can merely glance, I must now draw your attention to the structure of plants, and to a description of their organs. In investigating the structure of plants, that of the leaves becomes essential, to know as well how plants live, as how they should be fed; that is, to those who are desirous of understanding the principal branches of knowledge, on which all sound agriculture must be based. Among the circumstances connected with the structure of plants, the organization of the leaf is of the greatest importance. The upper side differs generally from the under; when subjected to the magnifying power of the microscope, this difference is very striking. The under part of the leaf is found to be studded with little holes, or pores or mouths, which sustain important functions or relations to the life of plants. They are very numerous. To give you some idea of their number, I may mention that on a square inch of a single leaf, twenty thousand of these little pores have been seen and counted. The number of these pores indicates to those who have studied this subject, the circumstances of climate and atmosphere to which the plant is adapted.

Prof. J. here pointed to a diagram representing, on a large scale, the form of the pores of three different plants, showing their difference in size and shape. This peculiar structure, continued he, is so intimately connected with the functions of the leaf, that I must dwell upon it for a moment, to illustrate in what manner plants live, so far as their growth depends on the air. By means of these pores, they suck in aerial food from the atmosphere, the mode in which they drink it in, the quantity and the circumstances under which they absorb it most favorably, that is, the circumstances of temperature and moisture, are related to the form and number of these pores, as they occur in particular kinds of leaves.

The structure of the stems of plants, is also one much connected with their growth. Those who have the curiosity to examine the structure of the stems of plants, have only to turn to Prof. Emmons' volume

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on the Agriculture of the State, where sections of plants and trees are given with great accuracy and beauty. These, as Prof. E. well says, exhibit in a strong light, the important relations which science bears, to the practical cultivation of these plants.

The structure of the roots of plants, is another important point, requiring a minute study into the manner in which the stem, tapers down into the extreme fibres of the root, of the spongy form of the extremities of the roots, which enables it to draw to it, all of sustenance that it gets from the soil. Thus the habits of these roots are important. Some plants spread their roots over the surface, as the turnip, which spreads its roots to the distance of four or five feet. You may readily trace them to the distance of three or four and even five feet, showing from how great a distance these plants draw their sustenance. Some plants descend to a great depth. This is another important point; for if the habit of a plant, is thus to go down to a great depth, and if the deeper it goes, the more food it extracts from the soil, then it is quite clear, that the more shallow the soil is kept, the less the farmer has studied the soil.

Now among the plants of this habit, wheat is one that will send its roots three or four feet into the soil, in search of food; and the more mellow the soil, the more easy is it to get the food, which enables it to grow to a great height and to reach its maturity. Hence a knowledge of this fact, in regard to wheat and flax, suggests the necessity that the soil should be deeply cultivated—that the farmer should plough deep, in order to avail himself of this store-house of natural food, which is essential to supply the wants of the plant and enable it, through the medium of its roots, to bring this food to the surface and make it useful. Thus, some plants have roots so formed, that they will grow only in light soils—others in stiff soils only. Wheat requires a strong and stiff soil—the barley and the turnip a light soil, and this fact indicates that where a farmer has only a strong soil, he must lighten it in order to grow barley or the turnip; and that some soils must be drained in order to cultivate these two things.

On the other hand, the different kinds of plants indicate to the skilful man different kinds of soil. If I had a geological map, and if time permitted, I could have shown you how certain plants indicate certain geological formations; how I could know from the kind of plants growing on a particular spot, of what rocks the soil was formed, and what kind of rocks I could there look for with certainty. I have here a list of different plants, with the different geological formations on which they are found; but I cannot dwell upon it. I have a list of trees also, which

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are peculiar to certain formations; but I prefer to draw your attention to the agricultural indications of plants.

Certain plants, (the names of which I need not give, as they are scientific names, and require a knowledge of Botany to understand them,) certain plants indicate certain soils, as the thistle indicates a rich and productive soil—keep down these thistles and you have a good soil. Brambles indicate a loamy soil; the wild radish, a poor soil; the rush, a good soil, but one that is useless for want of drainage; the common rag-wort, which occurs in arable lands, indicates that the land is badly cultivated.

Then you all know that trees indicate different varieties of soil. The beech, a light soil; maple, also a light soil of a very superior character. I have here a list of forest trees, and the different formations which they severally indicate, but I need not dwell on this part of the subject.

The habits of plants, particularly of those which infest the soil, are important as teaching us how to exterminate them; that is, it is important to know whether they are annual, biennial, or perennial. Those that are perennial, like the Canada thistle, indicate from that fact how they are to be exterminated; if annual, they must be kept down every year; if biennial, they must, to be exterminated, be attended to once in two years. Perennial plants require to be more effectually exterminated, according to the character of their seeds—as, for instance, whether they are strong, and will remain long in the ground without rotting. The seed of the pigeon weed, for instance, is of this character, and may be carried to great distances without being destroyed. This vitality of seeds, therefore, is of great consequence to the practical man.

Again, the mode in which plants are propagated is another subject of importance. Many of them are propagated only by seeds, and if you destroy the seeds, you are certain they will not appear again. But there are others which are propagated not only by seeds, but by running roots; of this character is the Canada thistle, so that if you cut down the plant, before the seeds are ripened, the roots will propagate and increase the crop. So with the common twitch grass; the more you cut it down, the more it will grow. These facts bear closely on the practical operations of the farmer, and in this respect botany has a direct and a special reference to the art on which the farmer lives.

I need not go farther into details, to convince you how far an ignorance of botany stands in the way of progress in agricultural pursuits. But there are many different kinds of plants, which botanists study, which are of particular interest to the practical farmer, or which, at least, possess as high an interest to them, as any other.

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I may mention mildew, smuts and rust. This is a subject of the highest interest. By examining them closely through the microscope, botanists have discovered how they grow—what they are—how they propagate—how they get into the plant and seed—and how they may be exterminated. It is obvious that to exterminate smut, you must either destroy the seeds, when they have come to maturity, or destroy the plants before they have attained that state. But of all the smuts or fungi, as they are called, that injuriously affect plants, the potato disease is one of the most remarkable; and when we consider how important a root, potato is, and what great distress has followed the effects of this disease, you cannot fail to see that this branch of knowledge, the province of which, is to investigate the causes of disease like this, is deserving of all possible encouragement. And though no study arrives at maturity at once, still, because we cannot discover everything in a moment, or by as short a process as we could wish, we are not, on that account, to discourage these investigations.

Among the various kinds of smuts, affecting corn plants, that which affects Indian corn, is the most remarkable. I have never seen its effects myself; but it is described as remarkable from the fact, that it can only be exterminated, by selecting the seed from localities not affected by it, or by cutting it out as soon as it appears. But the most singular and interesting, is that kind of fungus that affects rye. It affects the ear of the rye, and the affected grains assume an appearance, not unlike small spurs, sticking out. This ergot of rye, as it is called, shows itself in most places, in low, wet and marshy lands, where rye is grown; or in better land, in seasons of great rain, succeeded by great heat, and generally in moist years. When rye is affected in this way, the ergot being ground up with the flour, produces disastrous consequences, and persons have died who have eaten the bread made of it, under circumstances of disease of a remarkable character. In consequence of this discovery, this substance has been introduced into the list of medicines, and employed with effect in certain cases. But it is a curious fact that this same ergot is found not only in rye, but in various kinds of common grasses on which cattle feed, particularly among the rank grasses that grow in marshy places. It was immediately inferred that this kind of fungus, thus produced in these grasses, on which cattle feed, and which, in rye, produced the remarkable, feverish effects on the human body, was the cause of similar effects in cattle—which in many districts prevails to such an extent that the farmers find it impossible to secure calves. Of course, the remedy suggested is, the removal of the cause; and that is done by draining the marshes on

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which these rank grasses grow. There are none of you who may not see, that the application of the results of this branch of study, has a direct bearing on the practical, pocket interests of the farmer, as it enables him to avoid evils and prevent losses, to which he must be otherwise liable. I pass over any further illustrations on this subject of Botany, with a single additional remark: that this branch of science, in connection with Chemistry, to which now may be added, the modern science of Histology, has led to important results, in reference to the cultivation of plants.

Prof. J. here pointed to a diagram representing on a large scale, sections of the common carrot and beet. This is done altogether by the microscope, and they are faithful delineations, but if you apply to these small cells, which cover the surface, chemical substances, you can produce changes of color in one part and not in another; and knowing what kind of vegetable substances are lightened in color by chemical substances, you draw conclusions as to the nature of the substance itself, though the particles are so minute that the chemist could not extract them for examination. This constitutes that branch of science called Histology, and being applied to plants and animals, makes us acquainted with their entire nature, and on what circumstances these changes, when healthy and when diseased, must depend.

I pass on to Zoology, and you cannot but perceive that the science that developes the general habits and structure of animals, the natural relations of one to another, and the functions of their several parts, how they live, and how they live best, must be of importance to the agriculturist, and particularly that branch of it which relates to breeds of stock.

As to breeds of stock, a knowledge of Zoology is necessary to understand what is a breed, what qualities characterize different breeds, to know how to distinguish one breed from another, and how to preserve them pure—for the excellence of breeds is determined by the skill of the breeder. The physiology of animals is another branch, but want of time will not permit me to advance even the reasons necessary to satisfy you, that a knowledge of the diseases of animals involves a knowledge of the structure and habits of the animals themselves; and particularly that the knowledge of the habits of animals that we desire to rear, is of great consequence in the feeding of stock To know that the absence of light, and of all causes of disturbance and irritation promotes the fattening of animals, is of consequence. To know that the warmth of animals will enable you to save a portion of the food which

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would otherwise be necessary, and to keep more stock than could otherwise be kept, that you can keep some stock in better condition than others, if warm; these are matters of importance. I do not know how your cattle houses are looked after, but in New-Brunswick, I know that great attention is paid to this matter, and that the cold is carefully excluded from them. Exercise also wastes the substance of an animal, and he who would save the food, must avoid unnecessary exercise of his stock.

I do not dwell longer on the relations of Zoology to this department, but proceed to draw your attention to Entomology, or the study of insects. This study has been brought so prominently to your notice, in the Natural History of your State, that you cannot fail to see, that it is of great consequence to the practical farmer. There are insects which attack our orchards. The apple tree is liable to this attack; peach orchards are also liable to the attacks of certain insects. In England and Scotland, the forest trees are liable to these attacks. The Scotch firs particularly are subject to such attacks. Some sixty acres, covered with this tree, were in one instance completely destroyed by insects. The mountain-larch was, in one season, attacked throughout the whole island, and millions of these fine trees destroyed by insects. There are insects also which attack our crops. The wire-worm, every farmer knows; the turnip beetle often destroys whole fields, so that the turnips have to be sowed over and over again. Then there is the wheat fly. You, in the northern part of America, for many years have been subjected to the visitations of this insect. I should like to illustrate how serious these visitations have been. I have here notes of the progress of the wheat-fly in different parts of the United States, during the period alluded to; but in a recent volume of your Society's Transactions, I find an able paper on this subject, by Dr. Fitch, which precludes the necessity of going into details. I may state, that since 1842, it has spread from the east to the west, from the east to the north, and that its ravages have been more or less destructive in certain localities, gradually putting a stop to the growth of wheat, until during this last year, the wheat crop was scarcely touched at all; but in New-Brunswick it has ceased to be cultivated.

I said I should like to draw your attention to the effects of the attacks of these insects, where they have pervaded whole districts and exterminated almost, certain crops, and sometimes changing the system of cropping and husbandry. I take a single illustration in the case of Canada, and I shall present to you on this board two or three numbers, to show how striking have been the effects of the ravages of this fly on

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the habits of a people, and on the nature of the exports of the country. Prof. J. here marked on the black board, the relative proportions of wheat and oats raised in Canada in three different years.

	1827.	1831.	1844.
Wheat, bushels,.....	22,981,244	3,404,756	942,835
Oats, bushels, ...	2,341,529	3,142,274	7,238,753

The most striking change, is that between '27 and '44, between the two main crops. This diminution in the wheat crop, indicates many things, melancholly to contemplate ; not the least of which is, the individual misery and suffering, to say nothing of the loss of property which this change in the kind of husbandry, has brought upon the people visited by this insect.

Now there is only one other point, in reference to which I would call your attention, and that is, Microscopic Entomology, and the use of artificial means of investigating the nature of these minute animals, which can not be seen by the naked eye. First, in regard to the nature of these animals. If I take a little pure water, and place it under the microscope, I can perceive nothing like animal life in it ; if I put a few grains of pepper into it, you will see the water teeming with minute animals, which are now named infusoria. This is produced by the infusion of the vegetable ; hence the animals are called infusorial animals. They exist in all river and sea water, in large quantities. The number of their species and genera, are very great. It has been found that those which live in the salt water, will not live as readily in the fresh ; and when the fresh and salt water mingle, a change takes place, and the animals die in great numbers. They are naturally, short-lived, but this change of water causes them to die in greater numbers than usual ; and mingle with the mud carried down by the rivers, and deposited where the fresh and salt water meets ; thus forming those rich deltas, at the mouths of rivers, of which I have spoken in a former lecture. These rich deltas, as I have told you, are formed in part from the kind of material brought down by the water, from the different geological formations, near its source, but the extreme richness which characterises them, where the fresh and salt water meet, arises from the circumstance, that there is a great deal of this animal matter deposited on these deltas, and there undergoes decomposition, and mingles with the other materials of their composition.

When I tell you that if you take the mud thus deposited and wash out the sand, so as to leave the mud pure, it has been found to contain sometimes 25 per cent of the remains of these animals, you will see how much this animal substance must contribute to the chemical com-

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binations, which compose the soil, and to its fertility. It is interesting to know, from what causes, this richness comes, if you would judge correctly of the relative fertility of these soils, at the mouths of rivers and further up beyond the reach of salt water. As far as the salt water reaches, there the remains of animals, are found in the mud of rivers, and the more of them as you approach the salt water. But, gentlemen, these animals are also to be found in our *soils*, and though it has not been proved by investigation directly, that they are capable of injuring the roots of plants, yet it is not improbable that they do interfere with the profits of the farmer, and materially affect the growth of plants. In some geological formations, which you see represented on the map of the State of New-York, and of the United States, the remains of animals of this infusorial kind, are found in great numbers, and it is remarkable that in many of these formations, many of which are marine rocks, their remains are precisely of the same kind as those which are now found in the sea that washes your shores. I take great pleasure in alluding to this, because the researches into the nature of these animals, by Prof. Bailey, of the West point Institution, have contributed to shed new light on this subject, and have reflected high credit on Prof. Bailey, and the country to which he belongs.

I have been obliged to hurry rapidly over these subjects—but you see from what I have said, how wide they are; and you will see, as we proceed, that the general inferences to be drawn from them, are important.

If a science takes hold of the plough handles and points it deeper into the earth, in order that the roots of plants may reach a lower depth, for roots will grow deeper, if you will let them, and the deeper they go, the more robust the plant and the more profit to the farmer; if it accompanies us to the field and teaches us to put trees and plants at proper distances from each other, that they may have the benefit of fresh air, and thus bring new food in reach of their leaves—and how much of this sort of sustenance, they are able to take in—if it tells you of the causes of the fertility of mud banks and sea-islands, and where you are to look for soil of the richest quantity, and how you should select with reference to that point—if it follows you into your barns and tells you how to treat your cattle—and what is the effect of certain treatment—to what diseases cattle are subject, and how they are to be prevented and cured—and if it goes with you into the fields, and instructs you in the nature of the insects that attack your crops, and as to the means of destroying them; I put it to you to say, whether if science can do all this, it is to be considered either as useless or unprofitable to the farmer.

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Prof. J. closed his lecture by adverting to the feeling of contempt with which ignorant persons engaged in the humbler pursuits of life, and who are indebted to chemical science for success therein, regard a knowledge of such science, instancing as an illustration, the case of a washerwoman who used the soap which chemistry had taught the mode of manufacturing, who would tell you, if informed that without the aid of Chemistry she could do nothing—that she knew nothing of chemistry—that she washed her clothes as others had done before her, who knew nothing of Chemistry, and that she cared nothing about it. He remarked that this was true of a numerous class of farmers, in the old country, who performed all their operations, as it were, at second hand, which they had learned perhaps only from practical men; and if one of these men were told that science had done much to improve his art, and might do more, and he should reply that he was a plain practical farmer, knowing nothing, and caring nothing about science; gentlemen, he is an agricultural washerwoman, [laughter.] We have a few in England; I do not know, I hope at least, that there are none of them here.

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LECTURE FOURTH.

THE RELATIONS OF METEOROLOGY TO PRACTICAL AGRICULTURE.

GENTLEMEN: The lecture this evening is on the relations of *Meteorology* to *Practical Agriculture.*

You recollect that when treating of the relations of Geology to practical agriculture, I explained how it is that the rocks that form the solid crust of the globe, gradually decomposed and crumbled down, so as to form the materials that cover the surface, and from what hard materials the soil is produced. I explained that the causes of this disintegration of the rocks, were ordinarily to be found in meteorological agencies; that is, the warmth of the sun, the influence of rains and peculiar kinds of atmospheric action, combined with the severity of frosts and the alternations of cold and heat. From this, you will perceive that the study of meteorology is closely connected with the origin of the soils themselves, and with those geological phenomena which I presented as of great importance to the agricultural inquirer. But into these branches of the subject I do not propose to enter this evening with minuteness. I will merely observe in passing, that the study of Meteorology in connection with this branch of science, is highly important. But I propose to treat more particularly of what is called climate and of its influences on the growth of crops on various kinds of soil.

The main elements of climate are the temperature of the air, and of the soil itself; the quantity of rain that falls, and the character of the prevailing winds, and under these three several divisions are comprehended, minor branches of knowledge, each of which is of great consequence, and to some of which I will draw your attention.

You will recollect that I explained to you, in a former lecture, what is called mean temperature; that is the temperature of a whole day, month or year, taken on an average. To explain this matter fully, would require a map of the globe, which I have not now. I have only a map of England, which will serve, perhaps, to illustrate the subject sufficiently, as it is sufficiently extensive to show the different degrees of temperature in different latitudes, and though these differences are not as striking as they would be on a map of this country, yet they are

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enough so, to show the important influence which temperature has upon the growth of plants, and how decisive they are of results. If you have a map of the whole globe, and the ascertained mean temperatures at every place on its surface, you will find that on a given latitude, there are a certain number of places, where the mean temperature approaches nearly an equality; that is, that if you add the cold temperature of winter with the high temperature of summer, throughout this latitude, you get the average mean temperature of that latitude. Suppose there are fifty different points on the same latitude all round the globe, where the mean temperature has been ascertained, and you draw a line connecting these places with each other; then take another latitude, and draw a similar line connecting similar points, indicating another degree of mean temperature, and so on, you will then have a series of lines, indicating the mean temperatures of different latitudes in all the places through which these lines pass. These are called isothermal lines, a word compounded of two Greek words, meaning equal temperature.

You will recollect that I told you in a previous lecture, that where the mean temperature was 70 or 72 degrees, the sugar plant thrived most luxuriantly, and yielded the largest returns at the least cost of labor. You see, then, that if you follow these lines around the globe, whenever you find the temperature as high as 72, you know that there you are to look for the places where the sugar cane thrives best, and thus knowing what crops grow best on a certain spot, having a certain mean temperature, that other circumstances being the same, the same crops will flourish elsewhere, under the same temperature.

This is an extensive subject, and a great many observations must necessarily be made, in all parts of the globe, to determine these isothermal lines, and I have elements enough before me to occupy the whole evening, without fatiguing you, were I to use them in illustrating the interesting points which these lines present.

If you fix on two or more places, where from observation, you have the temperature of the summer months, and another set of observations of the temperature of the winter months, and another of the summer and winter months, and then connect all the places of which the mean summer temperature is the same, then you will have a line varying from the other lines, and thus you may draw a new set of lines. These are called isothermal lines; that is, lines indicating equal summer temperature; and so you may draw lines indicating an equal winter temperature, and thus you will have three sets of lines; one indicating mean temperature, all the year; another the summer, and another, the winter temperature. Now you will perceive the ap-

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plication of these observations, when I tell you that there are places where the mean temperature of the whole year is the same, and yet the temperature of the winter and of the summer, is very different; for instance, where the summer is very hot, and the winter very cold; yet the mean temperature of both, will be 60, the heat of summer in the one, compensating for the cold of winter; and in the other, the reverse. Of course the climate of two such places, is very different.—The climate of America, is different from that of England; and the vegetable productions which grow naturally in each, vary accordingly. And yet the mean temperature of the two countries, is about the same, the difference being caused by the different mean temperatures of summer and winter in the two. Here then is another study. The study of these isothermal lines, or of the temperature of summer and winter in different places, and of the mean temperature of the year. So that the more we enter into this study, the more we perceive the bearing of this branch of science, on the practical capital of the farmer.

Another point. I have spoken thus far of the temperature of the air only. But this is not the only thing of interest to the farmer; the temperature of the soil itself is of equal consequence. This is a study into which philosophers, whose researches are confined to the crust of the globe, have entered largely. If you bore down into the earth to the depth of 60 feet, and let down a thermometer into the bore, you will find that in summer, the temperature at a certain depth, varies. It rises in summer, owing to the fact that the sun affects the temperature of the earth down to a certain depth, and so does the cold of winter. The thermometer, indeed, will never remain stationary, until you reach a certain depth—about 50 feet below the surface—there the thermometer remains stationary the year through: showing that the summer and winter do affect the temperature of the earth, to the depth of 50 feet. The depth at which the thermometer remains stationary, indicates a certain degree of temperature of climate. If at Albany, for instance, it were fixed at 50 feet, it would be fixed at that depth, one hundred years hence, as no doubt it was one hundred years ago. These similar observations made all round the globe, enable you to connect those places, where the temperature of the earth is uniform, thus showing by a line, that they have the same uniform temperature at this depth.

Such observations have been made, but not so extensively as with reference to the temperature of the air. But as boring to such a depth, is an expensive operation, the observations have been, of course, limited. Such as have been made and connected by these lines around the globe, are called, when connected, iso-geo-thermal lines. But these observations are of no great interest to the farmer, but it does concern him to

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know the temperature of the earth down to 3 or 4 feet below the surface. Such observations as these have been made, to some extent, but not so far as is desirable. The temperature of the first foot is of far more consequence than that at a greater depth, because the seed is put in at a shallow depth, and vegetates at that depth; in the spring, and as the summer advances, the roots go down deeper and deeper.

When I tell you, that in such climates as this, the temperature rises to 100 degrees of Fahrenheit, 5 feet below the surface, and to 140 degrees half an inch below, it will excite, perhaps, some surprise. It certainly suprised me. Such of you as rear plants in gardens, or have read upon the subject, know something of the importance of bottom heat, for the purpose of forcing plants, which it is difficult to grow, or which it is desirable should grow luxuriantly. There are certain parts of the earth, where there is a natural heat from beneath, as in volcanic regions and from the sun—which heat causes a growth of great luxuriance. In the neighborhood of Ætna and Vesuvius, this bottom heat is most apparent, in the growth of plants. But of this, we, in these cold latitudes, see nothing.

In a subsequent lecture, I shall draw your attention to the effect of drainage upon the warmth of the soil. But you will see, from what I have said, the great importance of a certain degree of warmth in the soil where the plant is sown.

From experiments made one year, in this neighborhood—I know nothing of them, but I speak from the representations of others—upon Indian corn, which you know, often rots when put into the soil, it was found that when the temperature of the earth was but 45 in the spring, the seed all rotted; but when planted, when the temperature was about 60, it vegetated. These facts show the great importance of knowing, first of all, that the temperature of the soil has a close relation to the operations of the farmer and to the profit of his industry; and next that the study of the temperature of the earth is of great consequence in developing the various conditions of the soil, which are necessary to profitable farming; thirdly, that if any means, within the compass of art can be found, which will make the soil warmer than it otherwise would be, and which shall impart that warmth early in the spring, we shall have arrived at a method of controlling nature, as it were, which must lead to important results. Drainage is one of these modes, and has been found of great practical utility in making the soil warmer at all seasons, and of particular utility in making the soil ready for sowing in the spring, as it enables the farmer to avoid losses by the seed rotting. It is specially important, in my country, where scarcely half the wheat sown, vegetates.

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I pass on to another subject, or rather to another branch of this subject. I speak of the sun's rays, and of the warmth that the air and the earth derive from the sun. The rays of the sun, by the interposition of an instrument called a prism, can be decomposed, and separated into several different colored rays. This is familiar to all. But other things have been ascertained, which are not so well known. It has been found that, besides the fact that the sun's rays consist of light of different colors, which, when mixed, form a white color, that they contain three different kinds of rays. There is a ray of light—that you know; there is a ray of heat, but the rays of heat are not the rays of light. On the contrary, we can separate the one from the other. The sunbeam contains, also, a chemical ray; so that, though colorless, it consists of three different kinds of existences—not matter, but agencies—the one being heat, another light, and the third a chemical agent. I shall go into this subject further, in a subsequent lecture, when I will show you how plants grow. At present, I shall merely glance at it. When a plant takes root in the ground, chemical changes go on; the more numerous the parts of the plant, growing at the same time, the more numerous these chemical changes. These changes are produced by the agency of the chemical element of the sunbeam. Thus, when the plant is beginning to approach maturity, and to ripen its seeds, then it requires the aid of heat. The warmth of the sun is necessary to ripen the grain.

Professor J. here pointed to a diagram exhibiting the colors of the different rays; the blue indicating the chemical ray, the yellow the ray of light, and the red the heating ray. But, said he, the point of consequence to the farmer, or at least the one of importance as showing the relations of the science of light to the art of Agriculture, is this, that these three agencies exist in different proportions in the sunbeam, in the spring, summer, and autumn. The blue, or chemical ray, is greater in the spring; the light greater in the summer. The chemical ray is less in autumn, and then the heating ray predominates. It is enough for me to state here the results of investigation, as represented by these different colors and their relative lengths, and to say that, by means which it is unnecessary to state, the proportion of these different agencies in the sunbeam vary in different seasons of the year, in order that the growing plant may arrive at maturity, and thus be enabled to perform the functions necessary to its healthy growth. But I cannot dwell upon this further than to say that here is a most interesting subject opened to us, which promises much interest, as further developments are made, because it has not only been ascertained that

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these agents exist in different proportions in the sunbeam in different seasons of the year, but the experiments of Dr. Draper, of New-York, indicate very clearly that the proportion of these agents vary in different latitudes and climates. This is in perfect consistency with what I have stated, that the wants of plants are different in different seasons; and it may well be inferred, therefore, that these results are founded in truth. Thus, you see that this very interesting branch of study is also of great importance, and must have a close relation to the operations of the farmer.

But you will be interested while I draw your attention for a moment to another fact. You know the different changes which take place in the plant, in its progress to maturity, from the flower to the seed. It is known, that generally the flower of a plant has a higher temperature than the other parts of it. This is generally the case. It has been ascertained also that the darker colored flowers absorb the heat of the sun's ray, more than those of a light color; hence it is very probable that the colors of the flowers of plants, are connected with the quantity of heat which the flower requires to perform its functions, and that in ripening the grain, the color of the flower is adapted to absorb from the sun's rays precisely the degree of heat which is necessary to perform its functions.

Another point: the influence of light on a clear bright day, is different from that on a dark day. When the grain begins to fill, a cloudy day is better for it than a bright one—that is, when the sun is obscured and the temperature not very low. The number of clear days and cloudy days in a country, is one element of its climate, and one of those which tell on the rapidity with which crops grow, with which certain profitable crops can advance, and on the period of the year at which they will ripen. Indian corn and buckwheat, for instance, are both liable to be touched by early frosts, and if the character of the year be such as to enable these crops to come early to maturity, they escape the danger of these early frosts, according to the prevalence of sunny days, and the absence of cloudy weather. I need not dwell on the subject of frosts, for all know their effects in spring and fall, and that to the gardener, as well as the farmer, and to all engaged in husbandry, these are matters of great importance.

Another circumstance of climate, connected with low temperature, is the relative duration of the different seasons, especially of winter and summer, as representing the whole year. The transition from summer to winter, and *vice versa*, is very sudden at the north, so that they have only summer and winter, so to speak. The relative duration of sum-

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mer and winter, has an important bearing on the rural economy, which the farmer should adopt, if he would derive profit from his labors. Where the winter is long, the farmer must lay up winter food for his cattle, to sustain them, when they cannot be turned out. Here, you have six months, during which you must provide food for your cattle. In New Brunswick, the average duration of winter is 6½ months.

Another way in which winter operates, has reference to the period in which out-door labor may be performed. In the spring, he must sow early, that in autumn his crop may escape the early frost; but if the period which intervenes between the passing off of the snow and the time for sowing is short, it is obvious that the farmer must not only plough early, but must do it very rapidly, and the shorter the time, the greater the force required to do it. Here, therefore, is a serious drawback on the profits of the farmer, and one of great interest to him. In connection with this point, it is of great interest to know how far the winters of different places differ.

One curious circumstance, perhaps, you would not anticipate, is this: The average length of winter at Frederickton, New-Brunswick, which exceeds yours by some 25 days, does not appear to interfere with the produce of the land in the more northern climate. In the northern climate, vegetation grows more rapidly in spring. It is a curious fact, that on examining the average products of New-Brunswick, New-York and Ohio, the average produce of New-Brunswick is found to be greater than that of New-York or Ohio, though the summer is longer in both these States. Therefore, the farmer in these northern regions, has every encouragement to occupy every leisure moment in the preparation of his land, for the soil is not niggardly in its returns, though they must do more work in less time than in more southern countries.

Another fact; though the severe frosts last so long, they are not altogether without benefits; if the frost descends to the depth of three or four feet, as it does in the country between the St. Lawrence and the Bay of Fundy, the effect of warmth is such that it heaves up the ground, and renders it almost ready to sow wheat, as soon as the frost is out; and it is a fact which practical men tell me, that the depth of the frost actually aids in preparing the land for the crops, and makes the work of plowing easier. Thus we see that nature is sometimes far kinder to us than we to ourselves, and that while she is shutting up land, as it were, she is preparing it, the better for use when the summer sun shines; so much in regard to temperature.

I told you that the next element of consequence, was the quantity of rain that falls. On a former occasion, I described to you the condition of various parts of the earth, where no rains ever fall. In parts of Asia,

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and Africa, no rain ever falls. Now the fall of rain, is a matter of interest. First, in regard to the quantity. Secondly, the time when it falls; and thirdly, in regard to the manner. First, as to quantity. From the observations made in different places, I cite a few statistics. In London, the quantity is 23 inches, that is to say, supposing all the rain that falls, is dammed in and measured. In Edinburgh, it is 24 inches; in Liverpool, 34 inches; in Manchester, 36 inches; in Keswick, a very wet place, 76 inches; in New-York, 42 inches; in Rochester, 39 inches; in Worcester, 39 inches; in Portland, Maine, 44 inches; in Savannah, 55 inches; in St. Domingo, 150 inches; in Bombay, 80 inches. In some parts of the world, I may state, as on the Runn of Kutch, in India, between June and September, 240 inches of rain falls, that is, during the rainy monsoons. You all know how important the quantity of rain is, to the growth of plants. Let me illustrate this, by reference to the statistics of my own island. On the west side of the island, you will have seen, that the quantity of rain that falls, is greater than on the eastern. At Edinburgh, it is 24 inches; at London, 23 and 24; but on the west side, at Liverpool, it is 34 inches; at Manchester, 36; at Keswick, 76. This is found to be universally the fact, that more rain falls on the west, than on the east side; and it is known, that the green crops, the potato and the turnip, which require more moisture, are more grown on the western, than on the eastern coast of England. The average of these crops, in the western part of the island, are nearly double the average of the same crops in the eastern part. Thus you see that the kind of husbandry depends upon the quantity of rain that falls. Where no rain falls, there is of course, barrenness, unless certain causes come in to supply the deficiency. Where rain falls periodically, as on the Runn of Kutch, there you have a season of growth, and a season of barrenness. Where rain falls in autumn, it often impedes the ripening of grain. In Iceland, where the temperature is high enough to ripen barley, the rain comes on in autumn, to prevent it. But there are circumstances, which, whatever the season at which the rain falls, modify the kind of husbandry, and render the soil capable of producing certain things, which naturally could not be grown. Suppose the rain to fall only in certain months; the consequence is, that evaporation, not being as great as the rain that falls, the land becomes saturated with water, and the consequences of this are well known.

But art can do something to make such lands capable of producing some crops which they otherwise could not, and that is, by drainage. An artificial mode of relieving land of surplus water, not carried off by evaporation, and which otherwise must remain and stagnate. Drainage

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is of two kinds: one is for the removal of springs, the water that comes from the earth—the other for the removal of the surface water which falls from the clouds, and which cannot be evaporated. All know that stiff clay soils require such drainage. In our climate, all the clay soils can only be made productive beyond their natural capabilities, by drainage. But there are other soils of a light character, such as the loamy soils, approaching the character of gravel and sand, which have been found to be improved by a thorough drainage for the removal of the surface water. But drainage becomes more or less important, not merely with reference to the character of the soil, but to the quantity of rain that falls. Take, for instance, London and Edinburgh, New-York and Rochester. The quantity of rain that falls in these places, other things being equal, determines the degree of necessity for drainage. When I tell you that near Edinburgh, where the rain is only 24 inches, it is found that an expense of five, and even eight pounds an acre, for drainage only, is found to be profitable, in the removal of surface water, you will perceive that it is a matter well deserving the consideration of the practical man, who desires to improve his soil, whether this system of thorough drainage, could not be introduced with advantage in this country, where the rain that falls is more than in England. We find that in almost all soils, such expenditures are not only profitable, for the time being, but that it pays its own expense in a few years, and leaves the land permanently good. At Albany, you have 40 inches of rain, and in other places mentioned, you have much more, showing that in this State, at least, the land would be improved by this system of thorough drainage. One observation here. It would appear that the extreme heat of your summers ought to render drainage unnecessary, but when I tell you that among the places with which I have had communication, by letter and otherwise, are Jamaica, and Barbadoes, and Demarara, where the summers are as hot as yours are, and where the soils are often stiff clays, liable to be dried up by the heat of summer, and that in these places where I have recommended drainage, the results of the experiment have been that the land has been improved in productiveness, and has yielded far greater crops than similar land, not drained. You will see that the removal of water from stiff clays, by drainage, even in climates where the summers are hot, and are characterized by great drought, may be resorted to with advantage and profit, and that after all, the quantity of rain that falls is of more consequence than the heat of summer.

In connection with this point, let me draw your attention to another mode, by which wet and marshy lands can be benefited. It does not

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properly come in here, but it will serve to show you what great results may be accomplished by human ingenuity, when intelligently directed. Prof. J. here pointed to the northern part of England, to the Humber and the Trent rivers, saying that through the Trent, the tide runs with great velocity, far up the river, carrying with it a very muddy water. From the Trent, a canal has been cut for many years, for the purpose of bringing this muddy water from the river into the interior of the country, and pouring it over the surface of the land. Thus said he, the water is let in upon the land, twice every day; as the tide retires, the mud is left, and in the course of six months, it sometimes leaves a depth of six inches or a foot of sea mud, the fertility of which is well known. The same process has been adopted on a smaller scale in different parts of the island, and so it has in New Brunswick.

Another way of reclaiming land has been put to use in Italy. There are celebrated tracts of country, famous for having been once marshes. But in Florence, in Tuscany, there occur the most remarkable. It is called the Val d'Arno, and it is said to have been the course of a river which once flowed through the valley into the Tiber. The current being sluggish, the valley was once an entire marsh. Various efforts have been made to drain it—but more recently a process has been adopted which is exceedingly beautiful. The whole valley was divided into square portions, considerably elevated at one end of the valley, and the water being made to flow from one of these square enclosures into another, so that the whole valley became gradually filled up, and is now converted into one of the most fertile regions known in Italy. The water flowing, in fact, in a different direction from what it did originally. Thus you see how by adapting your operations to circumstances, natural difficulties may be overcome and made conducive to health and profit.

Among other things connected with this subject, I may draw your attention to fogs and mists, which often cause great injury to the farmer. You are accustomed to consider our climate as more foggy and misty than yours; but if these numbers I have given you are true, we have less rain than you. Whether we have more fogs and mists at certain seasons, I do not know; on the Thames and in London, fogs are more frequent than in other parts of England; and probably the ideas of our climate, formed by strangers, are the result of impressions drawn from visiting London alone, and not other parts of England. But the way we remove fogs and mists, except in the neighborhood of London, is by the removal of their causes—by drainage. Not having it in our power to do as in many parts of Italy, we have been obliged to remove water by drainage, and by this means, over a large portion of our coun-

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try, fogs and mists have disappeared. In Lancashire, there was a lake, which was celebrated for its mists and for the agues which prevailed in the neighborhood. Every man nearly was affected by it, who lived within the range of its influence; and so notorious had this become that the farmers in other and more favored localities, would never hire a servant who came from the borders of that lake; but by drainage, the land about it has been rendered as fruitful and healthy as any of the neighboring lands. So on the Tweed, a rich tract of country, the same disease was prevalent to a great extent, until the system of drainage was introduced, not merely for the sake of increasing the crops, but to remove these causes of disease. But the crops were much greater after drainage, and the result was, that not only the profits of the farmer were increased, but the ague and complaints of the lungs almost ceased.

I have now explained how fogs and mists were caused, and how they were removed. I have explained to you how a cold and warm current of air meeting, form a mist; but how is it with the air on the surface of the earth? Whenever the surface is wet, it is continually cold. If I pour water on my hand, the evaporation of the water causes a perceptible sensation of cold. Now, the air sweeping over marshy portions of land, becomes cool, and deposites water in the form of mists, and thus the injurious effects are produced, not only upon health, but upon the crops, in the shape of mildew and rust. As to rust and mildew, they are owing to the prevalence of too much moisture in the air, in the shape of fogs and mists, and the remedy is drainage. But this is not uniformly the case, because fogs come sometimes from large bodies of water at a distance. In New-Brunswick it often overspreads the country, from the Bay of Fundy, settling on the damp lands, and even on the dry. At the head of the Bay of Fundy, I am told, that the prevalence of mists, combined with a very hot sun, produces very injurious effects on the crops. But it often happens that a farmer on one side of a road suffers from the negligence of his neighbor on the other side; he perhaps drains his land, while his neighbor neglects his. Now, the farmer who understands the advantage of draining, could well afford to drain his neighbor's land at his own expense, as the fogs from the wet land in the neighborhood are often the cause of great injury to the crops on lands, which have themselves been thoroughly drained

There are other topics connected with this subject, but I cann touch upon them now; but you will see from what I have already said that in this subject of meteorology, are involved many different branches of study, every one of which might occupy the researches of one man for many years, and every one of which has a bearing on

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practical Agriculture, and the profit of it. And though the farmer may not see the bearing of these researches immediately, yet results are always arrived at, which are capable of a direct and practical application to the farmer's art, and when the range of the sciences shall be still farther extended, we can then extract from them all a system of principles, by which a practical and sound system of Agriculture can be established.

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LECTURE FIFTH.

(This Lecture was delivered at the annual meeting of the Society.)

THE RELATIONS OF CHEMISTRY TO THE SOIL AND ITS PRACTICAL IMPROVEMENT.

The Hon. John A. King, President of the State Agricultural Society, called to order, and introduced to the Society Prof. Johnston, who addressed the society as follows:

Mr. Chairman and Gentlemen: As there are present this evening a number of persons who were not in attendance at my former lectures, perhaps you will excuse me for mentioning, in order that the object of this course of lectures may be understood, that the purpose in view has been to present a general idea of the relations which science bears to practical Agriculture—not, of course entering into those details which the wide field presents—but dwelling only on those general aspects which hold a striking relation to this most important of all arts. Such of you as were at Syracuse, may recollect that I then mentioned that I might select illustrations, of the applications of science to Agriculture, and present them to you on the occasion of your annual meeting. As that address is now in your hands, you may readily ascertain how far this purpose has been carried out. The first of these lectures was on the relations of physical Geography to Agriculture; the second on the relations of Geology to Agriculture; the third on the relations of Botany and Zoology to Agriculture, and the last, on the relations of Meteorology to Agriculture. I may, perhaps, add to what I have said, that each of these lectures, being on a separate subject, is entire and complete in itself, and therefore contains in itself all the elements necessary to a comprehension of the general bearings of each subject to practical Agriculture. Thus this lecture, which has reference to the practical improvement of soils, will not draw on previous lectures.

Gentlemen, in drawing your attention to the relations which Geology bears to Agriculture, I pointed to this map of your own State and showed you the different kinds of rocks represented by different colors, of which the surface is composed, and I explained the process by which the va

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rious kinds of soil were formed—that is, by the crumbling down of rocks, of different formations, and that these materials constituted the chief ingredient in all soils. By this crumbling down of the rock, a loose material is produced, which formed, I would say, a substratum, in which the seeds of plants might take root and vegetate. These plants coming to maturity and dying, and others succeeding them to mature and die, with the insects and animals which feed upon them, and the remains of all being mixed up with the rocks in a disintegrated state—these form what we call soil, on which the labor of man is expended and crops are grown. Hence the origin of soils is, first, the solid rock; and second, the remains of vegetables and animals, which, while they enrich the soil, also give to soils that variety of character which exists.

In considering the quality of soils, there is one point to which it is necessary to draw your attention—that is, to the chemical relations of soils. I formerly drew your attention, and now do so again, to the fact that if you take the same kind of matter, exactly, you may convert it, without changing its chemical composition, from one mechanical condition to another. Thus, this piece of plastic clay, which would be difficult to till, may be converted into the hard, solid brick, which, if pounded out by artificial means, or crumbled down by atmospheric action, becomes a soil very easily cultivated. This mechanical character of the soil very much controls the kind of plants that will naturally grow on it. On very light lands, rye, of all grains, grows best; and of all food for cattle, spurry grows best on light, sandy soil. In Europe, it is considered an exceedingly milk-producing food for the cow. On loamy and gravelly soils, you know, barley is a kind of grain that grows best; turnips and Indian corn also do well on such soils. In fact, barley could not grow on a stiff clay, such as I have exhibited here; but it would grow well on the brick that is made of it, pounded up, and forming a loose and open soil. But on heavy, clay lands, wheat, clover, and grass grow most luxuriantly; and I showed you, the other night, that a stiff clay soil, though it would not pay for cultivation, will pay well if devoted to pasturage.

These physical characters of soils are of great consequence; and whilst I shall show you that the chemical composition has much to do with their fertility, and that after a soil is exhausted, and the art of man is brought to restore it, success depends greatly on a knowledge of this chemical composition, yet, I shall show you that whilst a knowledge of chemistry is important, the physical or mechanical condition of the soil is not to be slighted, and indeed is the first thing to be re-

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garded, and is, after all, considered more essential than that which we cannot see, and for the most part know nothing of.

I pass this over, and turn now to the chemical composition of soils. What does this piece of plastic clay contain, and what this hard brick? Both contain the same matter. In order to obtain that knowledge which shall be useful to us, as practical men, in tilling the soil, we must begin with some soil of known value and fertility, and which is known to produce good crops in ordinary seasons, and with ordinary treatment. When such a soil is taken—and there are many such here, particularly in the virgin soils of the West—we find it to possess a great variety of combinations. Before going further, I will repeat what I have said before, that all rocks consist of one or more of three kinds of matter—limestone, sandstone, and clay, or we have mixtures of them. This general view enables us to form an opinion of the physical character of soils at once. Sandstone gives a light, open soil; limestone, also; and clay, generally a stiff soil. Sometimes the clay is hardened, and the soil assumes a different character, like brick. But when you come to put these soils in the hands of the chemist—I mean these virgin, pure soils, which grow large crops, with little aid from labor—the chemist is not satisfied with the knowledge of the fact that they contain lime, sand, or clay, for he knows that clay itself is a complex substance, before he submits it to chemical analysis. He finds, as might be expected, that he extracts from soils these various substances, exhibited in this table:

Composition of soils of different fertility.

	Fertile without manure.	Fertile with manure.	Barren.
Organic matter,	97	50	40
Silica,	648	833	778
Alumina,	57	51	91
Lime,	59	18	4
Magnesia,	8	8	1
Oxide of iron,	61	30	81
Oxide of manganese,	1	3	trace.
Potash,	2	trace.	"
Soda,	4	"	"
Chlorine,	2	"	"
Sulphuric acid,	2	1	"
Phosphoric acid,	4	2	"
Carbonic acid,	40	4	"
Loss,	15	0	5
	1000	1000	1000

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But first of all, let me draw your attention to a fact. If I take a match and ignite it, and allow it to burn away, you will find that a small portion remains behind after the greater part is burnt away. The part that remains is the wood ash. This is the result if you burn any vegetable substance whatever, and as in soils there is both vegetable and animal matter, if you burn it, a portion of it is burned away; but that portion always leaves a quantity of ash. But this matter will be more fully explained at our next meeting. The part that burns away is called the organic part, or organic matter; and the part that is not burnt, consists first of silica, which means flint, and then alumina, that is, the substance which gives tenacity to the clay. If I dissolve clay in water, and into that pour hartshorn, it immediately becomes milky, and a white substance is precipitated, called alumina. It exists largely in clay, and is what gives its tenacity.

The soil also is found to contain lime, magnesia, oxide of iron, potash, soda, chlorine, which is a kind of gas, of a greenish color, having a peculiarly strong odor and very heavy, and in this respect distinguishable from common air; a taper will burn in it, but will give but little light; it burns red, smokes, and soon goes out; it is so heavy that it can be poured from one vessel to another. This gas possesses many properties, but it is quite enough to know at present, how to distinguish it from other gasses or air. It may strike you as curious, that this gas exists in the soil, and chiefly in the form of common salt; indeed, every ten pounds of salt, contains about six pounds of this gas. Sulphuric acid and phosphoric acid, also form parts of the soil. Let me draw your attention to the fact that if you ignite a lucifer match, it emits a peculiar odor; that is the odor of phosphorus. When the match is first lighted, you perceive a white smoke; that is phosphoric acid. Carbonic acid also exists in the soil, but I will not dwell upon that now, as I shall speak of it in my next lecture.

The soil, therefore, when chemically analysed, is found to contain many other substances, than sand, lime and clay, and enables us to enter into the minutest kind of reasoning, as to the functions of the soil, in relation to the plant, and how the soil is to be improved. It is of great consequence to understand this composition of soils, and any one who wishes to know how to manage the soil intelligently, should attend to many things besides the substances it contains. You will see by reference to this table, that 1000 parts of a given soil contain 648 parts of silica, 57 parts of alumina, and 59 of lime—that is to say, that though all these things are present in a fertile soil, they are not so, in the same proportions, but that they vary in a certain ratio, in the most fertile soils.

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Another conclusion: we find that other substances exist in the very smallest quantity. I shall have occasion at our next meeting to show how ipmortant these substances are to the existence of vegetable and animal life. Though they exist in small proportions, yet that is not to be the measure of their value or necessity to the growth of plants. The importance of these substances is not measured by the numbers in this table, because their presence in small quantities is just as necessary, as that of those substances which exist in larger proportions. If I have the small finger and thumb, I have a hand that is not altogether useless; but to make a complete and useful member, I must have all—the smaller as well as the larger parts of the hand. The same parallel exists in regard to the soil. All the ingredients must be present, the smaller as well as the larger to make the soil—but though all these ingredients are necessary, and though every soil which grows good crops, either naturally or by art, must contain them all, I shall show you that it is not necessary that they should all be present in these precise proportions. It is enough to say now, that every fertile soil contains them all.

One step further: If I take specimens of several fertile soils, one from America, another from Asia, and another from Europe, and analyse all of them, I find every one of these ingredients in them; but no two of them contain any one of the substances present in all, in the same proportion. I exhibit here, (pointing to a diagram,) the composition of the soil on the plains of Athens. You will see that it contains 38 per cent of the carbonate of lime or nearly four-fifths of the entire soil. Here lime constitutes only 59 parts in 1000 of the soil. The plains of Athens are celebrated for their fertility—this, then is an illustration of the fact that a fertile soil, may contain all these things, yet that two, equally fertile may contain them in different proportions.

One step further: Soils of the same degree of fertility, may contain different proportions of these ingredients, but it may happen, that one of these substances is present in large quantity, and that may be injurious to the soil. Soda and chlorine form common salt. Those who have examined the soils on salt marshes on the borders of the sea, know that common salt abounds in those soils, and in such large quantities that crops cannot grow upon them. The soils reclaimed from the sea, as on the Bay of Fundy, are found to be loaded with salt, so that at first they do not produce even grass—the seeds do not come up—but after a time, the salt being washed out by the rains, the seeds grow. This illustration is in point, and shows how the presence of this substance in large quantities, instead of enriching the soil, makes it worthless. If I could draw your attention to many things that press upon

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me, I might ask, why, in all fruitful soils, we find these things in small quantities, and why it has been so ordered by nature, that where saline matters existed once in large quantities, and contributed to your use and mine, that the rains from the heavens should be the means of carrying off these things, present in too large quantities, and the presence of which precluded the growth of crops which sustain human life?

One step further: There are soils, not of this fruitful character—some which will not grow crops at all, or not enough to pay the cost of tilling them. There are other soils again which, with ordinary treatment, grow good crops. We have soils which are fertile, others which are barren, and others again which, naturally fertile, require proper treatment to make them productive. In the little catechism which I have published, and which has been republished in this country, with an introduction by Professor Norton, you will find a tabular statement of the composition of these three kinds of soils.

There is a soil (pointing to the table, ante 212,) which lacks three things—soda, potash, and chlorine. You see, also, that here are three things of which a trace only could be found in a certain soil. If I were to ask you how you would make that soil chemically equal to that in the first column, where the three are present, you would say at once, put in the three things that are wanting, and thus make up the deficient numbers. That is common sense. To make the two soils chemically equal, you have only to add these things that are wanting, in the proper proportions. Now, manure adds these ingredients.

Here is another soil which is barren. You see here that no less than six substances are missing—half the whole number—potash, soda, chlorine, sulphuric, phosphoric, and carbonic acids. This is a large gap; and ordinary manuring will not make it grow good crops, as it would not restore the chemical agents present in other soils. You perceive also that a large proportion of the soil consists of oxide of iron—81 parts in 1,000. This illustrates the fact that certain things may be present in too large quantities. I could point you to many places in England where this is the case. It is a noxious substance, which creeps in under the soil, forming a hardpan, lying between the under and upper soil, and the roots of plants cannot penetrate it. If present in such quantities, it presents a great difficulty, because it is necessary to remove the excess. Where the soil is overcharged with salt, rains will wash it out; but this is not affected by them. Nature does much for us, however, by carrying it down below the surface, and thus points out the way which we must take to remove it, when necessary. Thus, the

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barrenness of a soil may arise either from its not containing the proper substances, or from containing some of them in too large quantities.

What are the purposes served by the substance of the soil? I do not mean to enter fully into this matter to-night, for it would lead me into too wide a field; but you know a common purpose for which soils are necessary to the growth of plants. It is illustrated by putting a piece of wood into a piece of clay, it forms a basis in which the plant may anchor itself and maintain an upright position. That is an important function of soils, though it be only mechanical. If a plant, like barley, tends to go down into the earth, the soil must be open. So with other plants like wheat, which however, requires a stiffer soil. This is the first function of soils; a mechanical function entirely. But there are others; generally they feed the plant. This I shall illustrate particularly at our next meeting. But I will now call your attention to the fact that if you burn wood or other vegetable matter, the ash will remain, that is, the inorganic part. The part that burns is the organic part. The inorganic portion it is the function of the soil to supply.

Another function of the soil is, that it not only fixes and feeds, but carries in food to the plant. This flint will not dissolve in water, but if I take potash and reduce the flint to powder and put it in, I can dissolve it in the potash, and when dissolved it looks as clear as water; but it will contain the flint in solution. I will show you that by a mechanical contrivance of this sort, the plant actually acquires and contains a quantity of flint, and that that being insoluble in water, is by the agency of potash, carried up into the plant and left there. This potash makes the silica soluble. It serves as a car to carry in the silica to the plant, so that the substance of the soil not only serves to feed and root the plant, but there are things in the soil which carry into the plant those substances which otherwise they could not get, and leaves them there.

These are the principal functions of the soil. At our next meeting I will describe to you others, which will become more intelligible as I open up the composition of plants. But on this subject allow me one more observation. Take a fertile soil, however rich, and suppose it to grow crops for 30 or even 60 years; a time will come when it will not produce crops. Every farmer knows that, and he knows also how much the richness of the soil is abused. This is called exhaustion; and the tables before you illustrate what it means. Suppose a soil, having the composition of that in the first column, will grow crops without manure. Suppose one of the kind in the second, will grow crops with manure; but that they have become barren by a particular course of cropping,

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and you know that where tobacco, cotton and sugar are cultivated, great tracts of country have become exhausted. There is also what is called general and special exhaustion. But this subject I shall advert to more particularly when I treat of the application of chemistry to manures. If I take away phosphoric acid and potash from a soil, it will produce no crop. If there was any process by which I could totally remove the phosphoric acid, the soil would be reduced to perfect barrenness. That would be special exhaustion. The loss could be repaired, as general exhaustion is, by the addition of manures; but the addition of substances that contain the one thing only, or some other thing, is the surest way to give the plants their supply. This subject of special exhaustion will be of use bye and bye, when I consider how soils may be chemically improved.

There are two modes of improving soils. I have spoken of the composition of soils. You see how they vary, and what differences there are in the qualities of soils, and what it is that constitutes equality of soil, and what the relation between these and the chemical composition of soils. But how are soils to be improved? There are two methods, the mechanical and the chemical. Of the mechanical method I shall now speak, and of the chemical in my last lecture. Among the various mechanical methods of improvement, there are three principal kinds. The first is deep ploughing; that in almost all cases is found to be important and profitable. In all countries where I have been, in all parts of Europe which I have visited, experience has shown that the soil generally is not ploughed to a great depth, 3, 4 or 5 inches is almost the maximum depth of exhaustion. It is very often the case, that persons exhaust land, until they can raise no more crops, and are then compelled to leave. The person who succeeds them, seeing the system of tillage that has been practised, instead of adopting the former system of shallow ploughing, goes down deeper and turns up a new soil altogether. Very likely in this new soil, are found accumulated the materials which the other soil once contained. The manure that has been put on and accumulated below, is turned up, and the new comer gets, perhaps, not only a good virgin soil, but much of the money that the old farmer has buried there. This is no hypothetical case. If it were, I would not state it, for speculation and hypothesis are good for nothing. In the neighborhood of Edinburgh, there are farmers of the greatest skill, and who make a great deal of money; and as a general rule, you may judge of the skill of a farmer by the number of sovereigns that he has pocketed at the end of the year; it is a very good test. One of these farmers, after hearing one of my lectures, in explanation of this simple

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principle, told me, that though he lived so near Edinburgh, the thing had never occurred to him before, nor had he ever heard of it; and he immediately went to work to carry out the principle, and by ploughing down, he had brought to the surface a fresh soil, and was then growing luxuriant crops, where he had thought the land entirely exhausted. Therefore, it is quite true, that in the under, or sub-soil, there accumulates many substances which have drained through from the upper soil, which make it full as rich as the upper soil once was, and that the farmer takes the cheapest steps to reclaim poor land, exhausted by severe cropping, who ploughs deep.

This must be sufficient to show the value of the sub-soil, when turned up and mixed with the upper. I need not dwell on this; but I have this remark to make; that it happens sometimes that various substances accumulate beneath, which are injurious to the plant, and in order that they may not injure the upper soil, it is not always advisable to bring them up. There are districts in my country, where the sub-soil is a white clay, which is so barren, that if brought up, it might destroy the upper soil, and therefore it is carefully avoided. This is the case in many parts of the world. It is quite proper not to do so; but not an unfrequent resort with us, as a means of deepening the soil, where the sub-soil is impervious or noxious, is to cut it through, so that the water sinks, and as it sinks below the level of the soil, the rain falls, filling up all the pores in the soil to a certain point, which, with the fresh air, effects a chemical action on these substances, changes them chemically, and gives them either a nourishing quality, or modifies the sub-soil, so that when brought up, it will not be injurious or noxious to plants.

This is the object of sub-soil ploughing; this is common in England, after draining in stiff clay soils. But the practice is also adopted where the land has been long drained. In Scotland, the farmers plough from 7 to 20 inches deep, and experience has shown that lands thus treated, not only retain every thing put on them in the form of manure, but are capable of growing crops for a longer time without exhaustion, than if they did not plough so deep.

Another mode, besides deep ploughing and sub-soiling, is called thorough drainage. I have spoken of thorough drainage, as applied to large areas; also of the drainage for the removal of springs. The drainage of lakes is going on in Sweden on a large scale, and that of springs in Scotland; but thorough drainage is only now begun, although probably thirty millions of money have been already expended in it.

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There are several questions in regard to drainage which are important. What are the effects of drainage on land, and how these effects are brought about? How does this system of drainage affect the profits of the farmer, and in what way does drainage pay him? The first effect of drainage—for I cannot dwell upon them, but must put them down here succinctly—is to carry off all the stagnant or surface water; 2d, it relieves land of water where it accumulates below, by the filtration of the rain through the surface; 3d, it causes the rains, instead of running over and washing the land, to descend where it falls, and this is the perfection of thorough drainage; 4th, as the rain sinks into the soil, it carries with it a continual supply of fresh air, and thus administers new doses of air to the substance of the soil; 5th, it makes stiff soils more crumbling, so that this kind of soil, instead of being hard to work after drainage, requires but half the force to plow it; 6th, it makes the soil warmer. You remember that I told you, that evaporation cools the surface; of course, if the surplus water is carried off by drainage, the soil is warmer. Then it also enables the farmer to proceed to till his land much sooner after the rains fall, and thus get ahead of others who do not drain their lands. So in the spring and autumn, in the open weather, he who drains his land has great advantage. And there is another advantage; it benefits his neighbor as well as himself, keeping the mists and fogs of his own land from that of his neighbor, while the man who neglects this, injures his neighbor by the converse process. Another point to which I have alluded, and at which I will glance now, is that by this means, you compel nature to do the artificial work of taking out from the soil what is injurious to it, much more cheaply than it could otherwise be done. I have spoken of the importance of the healthiness of a climate. Among the means of improving lands, this of drainage has been attended with one remarkable result, in contributing to human happiness. It happens that drainage, while it has improved the soil, has been the means of improving the health of large districts, a result which every benevolent man must contemplate with high satisfaction. Drainage is attended not only with these good effects, but it gives the farmer larger, surer and more valuable crops. Land that would once only grow oats, has in this way been made to grow wheat. Crops that were uncertain, have been made certain, and the product doubled in quantity.

On what land does it do this? on wet lands, no doubt; but when I tell you that it does so not only on wet lands, but on lands liable to be burnt up with the sun in summer, it may excite surprise. I have a suggestion to make in regard to lands thus liable to be burnt up; but

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of course, in making the suggestion, I do not intend that you shall go immediately to do it on a large scale, but that you should try the experiment on a small scale. But it is a fact, that on such land as I have described, thorough drainage has been found the most beneficial of all methods of improvement. In this neighborhood, you have sandy plains, and you have other stiff clay land. Now in summer, the sandy land bears the extreme heat, better than loam, and the loam better than clay; that is the soil which is most open, is least acted on by the sun. This is the case in the lands on the plains of Athens, of which I have spoken, which is liable to be burnt up by the sun.

Now if we consider the several causes by which this drought is produced, and how drainage affects it; you will see on what this experiment is founded. If the soil is merely burnt up by drought, and you suppose the roots to descend only to the depth of about 3 inches, it is obvious that the heat of summer dries up the land to the roots. But if by drainage, you open up the soil three feet deep, so that the rain, instead of flowing off the surface, descends through the soil, thus made pervious to it, the roots will grow deeper, and while the upper surface is dry, the drought does not reach the roots, which are thus enabled to live longer than they otherwise would. But there is another singular circumstance, with reference to soils that contain saline matter; potash is saline matter. The water with which it is saturated, comes to the surface, and evaporates, and this substance which is held in solution, is left on the surface, and kills the soil. Prof. J. here stated that he had sent him a specimen of the soil on the plains of Athens, for his examination and advice. On these plains, the grass grows luxuriantly in the spring; but as the sun grows more scorching, it gradually withers and dies. Prof. J. said that knowing the character of the rocks in that region, and that the sudden check to vegetation, was the results of the salt held in solution in the soil, and left upon the surface by evaporation the remedy was simple and easy; and that was drainage and ploughing. So that when the rain brought down the salt from the heights, it would also, run away with it, and not remain in the soil. Thus, you see, that the practice of draining, has been found to succeed, where it might have been least expected; and that it is an experiment well worth trying. I am sorry to detain you so long, but you will excuse me if I occupy a few moments, in answering the question, will drainage do in New-York; will it pay? I do not speak of this or that county, for I believe a discussion of this question, has already taken place, and that a great deal is to be found on the subject, in your volumes of Transactions; it is a discussion highly creditable in itself,

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and from which I infer that you have confidence that it can be applied with profit, to certain parts of your State; but some general considerations, may be of use. The quantity of rain that falls, determines the quantity that remains. The quantity in New-York, is much greater than in Great Britain; yet we find in Great Britain, that it is not only necessary, but profitable. Now, the first question is, as to the quantity of rain that falls. Without any other data, I should say, that the quantity here, renders it probable, that drainage would do here. Knowing as I do, the profit of drainage, where there are but 24 inches of rain, I infer that where there are 40 inches, thorough drainage must also be profitable.

The way in which rain falls, is also important, and how many rainy days there are in a year. I did not anticipate that I should be drawn into this point, and cannot tell the number of rainy days in New Brunswick. During four months, spent among the practical agriculturists there, and after a thorough canvassing of the whole subject, I am satisfied, that thorough drainage, though expensive, can be safely recommended. In St. Johns, where it rains most, there are 74 rainy days in a year, In New-York, 111; in Rochester, 115. Here is another argument which strengthens the probability, that thorough drainage, might be resorted to with profit. I do not recommend it, nor do I want you to adopt my opinions, because I state them here. It was my duty to go into every county in England and Scotland, with a view to this subject. I conversed with the most experienced, practical men, in whose way I was thrown. The results are what I now tell you; that drainage has been found effectual, in a country, where they have less rain than you; where the soil is not stronger, or heavier than yours, and where the number of rainy days is not greater than at the places I have mentioned in your State. This, being so, whatever opinions you or I may entertain, the inference is irresistible, that the system may be tried with eminent advantage to the practical farmer; and I would say that there is a probability, that thorough drainage may be the means of gradually improving your soils. I think it is worth while seriously to consider, whether you may not turn it to your own individual advantage, and thus contribute to the wealth of all.

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LECTURE SIXTH.

RELATIONS OF CHEMICAL PHYSIOLOGY TO THE PLANT, AND THE MODES OF PROMOTING ITS GROWTH.

GENTLEMEN: There is one aspect in which the art of farming seems exceedingly simple. If you look at the procedure of one of those who cultivates the rich land of the Genesee valley, which is a rich clay mixed up with a calcareous gravel, you see the routine which he pursues in the alternation of his crops, and you observe that he pursues this course regularly every third year, and you may naturally infer that this is a simple art, requiring no mental exertion to carry on all its details. It is because this art appears so simple, that farmers themselves are unwilling to believe that there are any difficulties connected with it, that it has been generally supposed that very little knowledge is necessary to practice such an art; that it needs very little intellect or intelligence, and that if a man is fit for nothing else he has brains enough for this. Besides the obvious effect which this idea has upon the agricultural community itself, it has its effect also in lowering the character of the agricultural body in the estimation of the other professions. Now, if the agricultural body has reasons to complain of the estimation in which they are held in other quarters—and it prevails among us and every where—it appears to me that these persons themselves, that is the class of agriculturists who refuse to believe that there is any difficulty in this art, such as I have described, are themselves to blame for a state of things of which they complain. Those are really the friends of the agriculturist who show that this department of art can be made more certain in its results and more lucrative by the application to it of the various branches of natural knowledge, and that he is indeed the friend of the farmer who seeks to bring to bear upon it the results of scientific research, and to show the world that there is really something complicated in this apparently simple art.

I have been led to these remarks in consequence of having reached that stage in my progress which brings this most prominently in view;

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that is, the relations of the soil to the science of Chemistry. You will recollect I showed you at our last meeting, that the soil is a complicated material, containing a great many substances, in different proportions, and on which proportions the quality of the soil depends. You will recollect that I showed you that the result of chemical research was the development of the fact that all fertile soils contained a certain number of certain things; and now I come to show you that all fertile soils do and must contain them, and that if certain of these things are wanting no soil can be fertile. To show the necessity of this I must bring under your notice the composition of the plant.

I explained to you at our last meeting, that if I take a vegetable substance and burn it nearly the whole of it burns away, leaving but a small quantity. I advert to this to show you that the same thing is true of the soil—as part of the soil burns away, and a part of every plant—but a certain quantity of each is left behind. Both contain a certain quantity of combustible and incombustible matter. In both, the first is organic, the second inorganic, or mineral matter. But they differ in this, that the part of the soil that burns away is very small compared with the whole mass, while in a plant the converse is the case; the largest portion of the plant burns away; so much greater is the combustible portion of it. [Prof. J. here pointed to a table showing the different quantities of ash left after burning different vegetable substances, wood, wheat, straw, hay, tobacco, &c.] Thus you perceive, said he, that in the case of the plant, first, the quantity of mineral or incombustible matter is less than in the soil, and second, that the quantity of combustible or organic matter is greater. Now, as the plant consists so largely of combustible matter, in order that we may know something of it, I must make you acquainted with some substances of which I have not yet spoken, as it will be necessary to illustrate not only what I have to say to-night, but at our next meeting. The part of a plant that burns away contains six different things, in different proportions—one or two of them in large proportions. This, [holding up a piece of it,] is common wood charcoal. If wood is ignited and closed from the access of air, it becomes charcoal. It contains all the mineral or incombustible matter of the plant. This charcoal, therefore, is a material representation of carbon. There are various forms of carbon, the diamond is one. But carbon is one of four or five other substances which constitute the combustible or organic portion of plants, and forms far the largest portion of it. Another substance is oxygen; a third hydrogen; a fourth nitrogen; a fifth sulphur; a sixth phosphorus.

Take any one plant, and the part that burns away contains these six different elements; but there are certain plants that do not contain all

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of them. Oxygen, hydrogen, and nitrogen are three different kinds of air. Here are three bottles containing these different kinds of air. There is no apparent difference in point of color, nor have they any smell; you cannot distinguish them by these senses. But a very simple implement enables us to do so. This little taper serves the purpose of a new sense to us. I do not know which of these contains hydrogen, which oxygen, or which nitrogen; but this lighted taper will soon tell me.

Prof. J. here put the taper into the bottle containing nitrogen, and it was extinguished; he then re-lighted it, and put it into another, that containing oxygen, and it burned brightly; next, he put it into the third containing hydrogen, and there was a slight explosion, which put out the taper, leaving, however, the snuff, which ignited again, when it was withdrawn—the gas itself burning—and which ignited also when placed in the oxygen. This, then, said he, enables me to distinguish these three gases. This, in which the taper kindles and burns brightly and re-kindles, is oxygen; this, which takes fire itself, is hydrogen; this, which extinguishes the taper, is nitrogen. These three substances, hydrogen, oxygen and nitrogen exist in plants in different proportions, not in the shape of air, but in a solid form. We cannot imitate it; but they do assume this form naturally. Sulphur, you know exists in small quantities in plants, and phosphorus in a still smaller quantity. Now, these substances compose the organic part of plants, or that part which burns away. But where does the plant get these things of which it consists so largely? the carbon comes partly from the air, and partly from the soil; oxygen partly from the air and soil; hydrogen mostly from the soil; nitrogen altogether from the soil; sulphur and phosphorus, altogether from the soil. Oxygen and hydrogen compose water, and the plant gets them either from the rain, or from the water in the soil; carbon it gets partly from the air and partly from the soil. Now that you may understand how it is that plants derive these things from the air and soil, I must make you acquainted with another substance.

If I take a piece of limestone, reduce it to powder, put it into a vessel, pour on it first a little water, and then an acid, as nitric acid, it will boil up, or effervesce. This boiling up or effervescence is produced by the evolution of a kind of air which produces these bubbles. In this kind of air, the taper will be extinguished. It therefore corresponds in this particular with the gas called nitrogen, in one of these bottles. How are we to distinguish between these two gases? It is in this way: If I undertake to pour the nitrogen into this glass, I cannot do it; if I undertake to pour it on this candle, it has no effect upon it; but if I take the gas which produces this effervescence and pour it into the glass, I

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can fill it, and though the glass appears to be empty, it will be found to be full of it, for if I put the taper into it, the blaze will be immediately extinguished. There is, therefore, this marked difference between the two gases: the one, the carbon, can be poured out into another vessel, because it is heavier than common air; but the nitrogen which is lighter, cannot be poured out; but it will rise. Hence the extinguishment of the taper is no test of the presence of carbonic acid or nitrogen; but they are distinguished altogether by their comparative weight. Common air is composed of 79 parts of nitrogen to 21 parts of oxygen, or nearly—carbonic acid constituting about 4-100 of it. This small quantity of carbonic acid exists in the air, and from this small quantity, plants derive all the carbonic acid which they get from the air.

How do they take it in? I showed you in a former lecture, that the under surface of the leaves of plants is covered with an immense number of minute pores, and that these pores vary according to the circumstances under which the plants live. They draw in through these pores, carbonic acid during the day, but not during the night. The very great number of leaves and surfaces thus presented to the air, enables the plant to draw from it the minute portion of carbonic acid necessary to its growth. This is one of the wonderful things, of which nature is full. You cannot but be astonished to find, that this never ceasing operation is going forward, and that the countless leaves of plants, which seem to us as intended merely for the ornament of trees, and to gratify the eye, by their perpetual motion, as the winds pass through them, are actually necessary to enable the plants to extract from the air, or to drink in the element so necessary to their growth and maturity.

I shall, at the next meeting, draw your attention to the substances existing in plants; that is to say, I shall show you that wood contains these elementary substances—carbon, oxygen, hydrogen and nitrogen—but that it does not contain them in the states in which I have exhibited them here, but in a different form, and I shall also show you that the plant consists of other substances, which are necessary to its existence as such. For instance, this piece of wood, (holding up a rod) consists of what we call, woody fibre, mostly. The stalk or straw of wheat, and grain, contains more than one kind of matter; so the seeds of plants, such as linseed, contain oil, among other things; so that we have all these things, growing in plants, in the wood, in the seeds, &c.

At the next meeting, I shall again call your attention to the functions of the leaf, and the manner in which the leaf acquires carbon from the

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atmosphere, in order to explain the functions of animal life, and to show how these functions are related. I cannot do this now, because I must introduce new names and things, and because the subject comes in more strictly in connection with the next lecture. But I may make one observation here in relation to these substances, nitrogen, carbon, derived from carbonic acid, oxygen and hydrogen, which compose water; that nitrogen is obtained from the soil in various forms, and that that is one form in which it is taken in by plants, but not so universally as some have supposed. There is one form in which nitrogen exists, and that is in ammonia or common hartshorn. The nitrogen, which is necessary to the growth of plants, is often taken in, in this form, though not universally; and though it exists in plants, in small quantities, yet it is of the greatest possible consequence to the existence of human and animal life. Thus much of the organic parts of plants.

I pass on to the inorganic parts of plants; and here I shall show you the necessity of those mineral substances of which I spoke at our last meeting. If you take the ash of wood, or of any plant, and submit it to the same chemical examination to which I submitted that part of the soil remaining after being burnt, you will find what the chemist tells you, that this ash consists, not of one or two substances, but of eight or ten. It will be found that the soil and the plant contain the same substances; the only one not in the plant being alumina. What is the function of alumina in the soil? Its mechanical function is to anchor the plant. Tenacity is necessary for this purpose. Some plants grow in mere sand, but the great majority of them require a certain degree of tenacity in the soil, which is obtained by mixing silica with clay. This alumina being clay, explains why it is that it is not in the plant, but only in the soil. It does not enter into the plant but gives tenacity to the soil, which is necessary to retain the plant. Take any plant, and it will be found to contain this ash, and this ash you will find contains all these substances, some in larger, some in smaller quantities. To show the composition of the ash of different plants, Prof. J. referred to the tables exhibiting the composition of the ash and straw of different plants.

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Composition of the ash from grain and root crops, and from the straw and husks.

Per centage of.	Wheat.	Straw of Wheat.	Oats without husk.	Straw of o's.	Husk of Oats.	Barley.	Straw of barley.	Rye.	Straw of rye.	Field beans.	Straw of beans.	Peas.	Straw of peas.	Turnips	Potatoes.
Potash, ...	23.72	12.44	26.18	19.14	8.13	13.64	6.31	22.08	17.36	33.56	53.08	36.05	4.73	39.82	55.75
Soda, ...	9.05	0.16	.....	9.69	.....	8.14	0.61	11.67	0.31	10.60	1.60	7.42	.....	10.86	1.86
Lime, ...	2.81	6.70	5.95	8.07	3.15	2.62	9.53	4.93	9.06	5.77	19.99	5.29	54.91	12.75	2.07
Magnesia, ...	12.03	3.82	9.95	3.78	1.09	7.46	3.22	10.35	2.41	7.99	6.69	8.46	6.88	4.68	5.28
Oxide of iron, ...	0.67	1.30	0.40	1.83	1.33	1.48	0.83	1.36	1.36	0.56	0.22	0.99	0.40	0.89	0.52
Oxide manganese,	.....	.....	.....	.....	0.61	.....	.....	.....	.....	.....	0.16	.....	0.15		
Phosphoric acid,.	49.81	3.07	43.84	2.50	1.54	38.93	3.08	49.55	3.82	37.57	7.24	33.29	4.83	6.69	12.57
Sulphuric acid,...	0.24	5.82	10.45	3.25	6.46	0.10	1.63	0.98	0.83	1.00	1.09	4.36	6.77	13.15	13.65
Chlorine, ...	.....	1.09	0.26	3.25	0.73	0.04	0.97	.....	0.46	0.73	2.56	.....	0.09	3.68	4.27
Chlor'e of sodium	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.13	.....	.....	
Alumina,.....	.....	.....	0.06	.....	.....	0.21	1.39	.....	.....	.....	0.32	.....	1.21		
Silica, ...	1.17	65.38	2.67	48.42	76.16	27.10	70.58	0.43	64.50	1.15	7.05	0.51	20.03	7.05	4.23
	99.50	99.78	99.76	100.00	99.20	99.72	98.15	101.35	100.11	98.93	100.00	100.00	100.00	99.37	100.20

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There you will see that all these different substances present in the soil are also present in the plant, but the proportions differ. You will observe that in the ash of wheat, oats, barley and rye, potash exists in the proportion of about 23-100, whereas, in the soil, the same ingredient is present in but a comparatively small proportion. So with phosphoric acid; it constitutes nearly half the ash of the grains, whereas in the soil it is exceedingly small. Now, this phosphoric acid, though present in small quantities in the soil, is so necessary to the growth of plants that they are found to contain a large proportion of it. Now, [pointing to the table exhibiting the composition of the ash of straw,] it will be seen that the straw contains but a small quantity of phosphoric acid. Potash in Indian corn is very like that in wheat. The straw of wheat contains a large proportion of silica; the ash of grain a large proportion of phosphoric acid. This acid rises as the plants grow, while the siliceous matter comes in by the roots and lodges itself in the straw. We see similar differences if we look at the composition of the ash of our green crops, as the turnip and potato; the potato is more than half potash, while the phosphoric acid is small compared with that in the grains. In short, every plant, taken as a whole, contains these things in proportions different from any other plant; and plants of different kinds or families differ materially. So different parts of the same plant contain these substances in different proportions. What is the inference from all this? Suppose a plant to be growing; it must get from the soil those substances which it most requires. If, in forming the flower and perfecting the seed, these substances must flow up readily, and the soil must furnish them in sufficient quantities, or the plant must cease to grow rapidly, this shows the practical applications or results that we shall arrive at—to which practical men have not yet done—but which when we shall have reached a system of refined Agriculture will enable us more intelligently to adapt our modes of cultivation to the growth of plants; and to that we shall come bye-and-bye. But to the practical application of these facts. First, you see what plants grow better in some soils than in others; that if plants grow well on a given soil, it must be because that soil supplies the wants of the plant. Now, some soils contain very little phosphoric acid; if the soil contains much potash and you put upon it a plant requiring little, it will not grow well, whereas, if you put upon it another plant requiring a great deal, it will grow well.

When speaking of the relations of Geology to Agriculture, I showed you that the kind of trees growing upon different tracts of land indicated differences of soil—differences arising from the geological confor-

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mation of the country, but they are in reality the result of chemical differences, or of differences of materials that enter into the soils, and which determine the trees that grow upon it. So with crops; if you select any soil and undertake to grow plants there, for a time they will grow well, just in proportion as the soil contains what the plant requires in greater or less abundance. If it requires a particular substance in large quantities, the continual growth of it will exhaust the soil. Let me explain this word exhaust. Suppose you plant green crops, as the potato, for years in succession, without adding anything to the soil, if the crops are large, you will take a large quantity of potash, particularly from the soil; besides taking out a portion of other matters belonging to the soil, it selects this potash in large quantities. After cropping for a long time, the land will cease to grow the potato, because of the exhaustion of the potash. This is what is called *special exhaustion*, that is, there may be enough of other substances left to grow the potato. Hence, in many instances, the addition of wood ash has been found to be a simple mode of making the soil grow the potato. Now, suppose in a case of exhaustion, that you introduce a crop that contains or requires but little potash or much phosphoric acid and alternate this crop with the root crops, it is obvious that the soil will hold out longer, because in that case, you do not draw so constantly on any one substance in the soil. This is one reason for the rotation of crops, and the most skilful rotation is that which is governed by these rules. Thus you see the meaning of the two terms, general and special exhaustion. Land is *generally exhausted* where this alternation is pursued for a long series of years, and will remain so until all those things are added which have been taken from it, in sufficient quantities to feed the plant. If I grow one crop continually, and that crop requires one thing to be present in the soil in large quantities, I exhaust it of that one thing only, and I can add that and restore the soil, if I know what that is. This is the great object of the researches and labors of science in this direction—a kind of labor requiring more study than you can well understand at a glance. The great object is to understand what a plant takes from the soil and what to put in to bring it back again.

Prof. J. illustrated this point by showing that a system of cropping might be adopted, which would lead to a partial exhaustion of the soil, and which it was vain to try to bring back again by ordinary manure, but which could be easily restored, and without any great expense, by applying to the soil, the substances which must have been taken from it by that system of cropping. Let me draw your attention, said he, to a fact familiar to you, in this country where there is little intercourse with the large towns, and where the farmer raises or

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makes everything at home—his soap, candles, &c. In making soap for instance, you know that the wood ash is essential; but the farmer, whom I have described, does not take the ash of soft wood, but of hard wood; he will tell you, that his reason is, that there is no potash in the ash of pine, and so it is in reality. Prof. J. went on to state the quantity of potash contained in the ash of different woods, adding, that the ash of those trees which contain most potash, is the ash of those which grow in soils where there is an abundant supply of potash. Tobacco is a crop that contains much mineral matter. Suppose an acre to yield 800 lbs. of tobacco. These 800 lbs. contain about 160 lbs. of mineral matter, which is carried off as it were, by this kind of crop, and which will ultimately exhaust the soil specially. You may think it remarkable, that in the rotation of crops, first, wheat, then turnips, then barley, then clover, then wheat again, a very common rotation, mineral matter may be carried off to the extent of 1300 lbs. per acre, you would naturally suppose that this would exhaust it more than tobacco, which in 4 years carries off 600 lbs. per acre; but here is the difference: we do not sell off the straw; we return that to the land in the form of manure, and by this means, the yearly loss is confined to that which is contained in the grain; the grain contains only 83 lbs. for 4 years; whereas tobacco carries off 600. Of course, tobacco exhausts the soil far sooner; that, I repeat, is special exhaustion, and knowing what tobacco carries off, we can supply it.* One other ob-

* We give an analysis, taken from Prof. Johnston's lectures, 2d edition, of the ash of the tobacco leaf, and the composition of a special manure for tobacco:

Potash,	12.14
Soda,	0.07
Lime,	45.30
Magnesia,	13.09
Chloride of sodium,	3.49
Chloride of potassium,	3.98
Phosphate of iron,	5.48
Phosphate of lime,	1.49
Sulphate of lime,	6.35
Silica,	8.01
	100 00

All the ingredients which are necessary to replace 100 lbs. of the ash of tobacco leaves, are present in the following mixture:

Bone dust, sulphuric acid,	23 lbs.
Carbonate of potash, (dry,)	31 lbs.
Carbonate of soda, (dry,)	5 lbs.
do magnesia,	25 lbs.
do lime, (chalk,)	60 lbs.
	144 lbs.

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servation, as to the particular operation of this. You see how a knowledge of what the plant takes from the soil, is necessary to know what is the nature of exhaustion, and what to put into the soil to bring it back again so far as mineral matter is concerned. The organic matter plays an important part in the growth of plants, but I do not speak of that now. But you see how a knowledge of the inorganic substances taken out by a series of crops enables us to show what to put in. But it does more; it enables us to prepare manure which shall contain all the mineral matters that the crops have taken out, and to make special manures adapted to special cases. I have prepared tables of special manures thus adapted, in order to restore to the soil what the crops have taken from it. This is important, for it points out how to manufacture what a farmer wants to promote the growth of any crop, and to restore land to fertility which has been exhausted. I do not pursue this matter further. I think I have shown you illustrations enough to satisfy you of the value of the application of refined chemical research to the plant, and, that though complicated, they have a practical bearing on the every day business of the farmer, and to show you how many kindred branches of science have been actually brought to bear directly upon the pecuniary profit of his pursuit.

At our next meeting I shall show you how science has been brought to bear on the rearing and feeding of stock, and shall present to you considerations on this topic which can scarcely fail to interest you; and you will then see that this wide field of science, over which the practical farmer may travel with advantage, becomes wider and wider with every step that he takes.

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LECTURE SEVENTH.

RELATIONS OF CHEMICAL PHYSIOLOGY TO THE ANIMAL—ITS FOOD AND ITS GROWTH.

GENTLEMEN: The subject which I propose to introduce this evening is an exceedingly wide one, as indeed I may say of all the subjects of which I have treated. At the same time, I think the points I shall be able to present this evening are so plain and intelligible that you can see plainly the width of the subjects of which I treat. You will recollect that at our last meeting I presented to you the composition of the elementary part of the plant; and I showed you, that if you take any part of a plant and burn it, that by far the largest portion burns away; that the part that burns away consists of four elementary substances, carbon, hydrogen, oxygen, and nitrogen. These three last being different kinds of air. I showed you, also, how they differed and how they were to be distinguished. It is necessary to re-introduce this, to make you acquainted with what is called the ultimate composition of the organic parts of plants, animals and soils. I wish to make use of these words, and unless previously explained you would not be able to follow them. First, I draw your attention, not to the elementary constituents of plants, but to the substances that exist in the plants which we eat; for example, the great mass of this rod consists of woody fibre; then, if you take a grain of ground wheat you know that it contains much starch; that is another substance that the plant produces. The sugar cane produces sugar; this sugar exists in all plants. These substances all consist of the elementary bodies spoken of. There is no nitrogen in these I mention, but others contain it. Now, of the crops we cultivate these three substances, woody fibre, starch and sugar constitute a very large proportion. But before I show you of what they consist, and in what proportions, I must explain to you the nature of the important substances existing in the plants which we cultivate for food.

If you take a quantity of wheat flour and make it into a dough, and ut this dough on a piece of muslin, tied over a glass and pour water

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on it, the water will pass through the muslin in a milky form. If you continue the process until the water passes through quite clear, a substance will remain, which the chemists call gluten. The milky substance which passes through the muslin, falls to the bottom in the shape of a white powder—that is starch—thus I separate wheat flour into starch and gluten. Now, this gluten contains all four of the elementary bodies I have named—it contains about 16 per cent of nitrogen—hence the nitrogen in the atmosphere is of great importance in the growth of wheat. Take any vegetable substance—the straw of wheat or of this piece of wood; and it contains a great quantity of fibrous substance called woody fibre—that exists in all plants. If you take this gluten and put it into spirits of wine and heat it, you can extract from it a quantity of oil. So with Indian corn, or oats, and from the stalk and straw of either you can extract more or less oil. We have then, first of all, the woody fibre, we have starch, and gluten, and oil; these four are important to the nourishment of animals and exist in all plants. But before showing the importance of these substances to the growing animal, I must show you the proportions in which they exists.

Average composition of 100 *parts of the more common grains roots, and grasses, &c.*

	Water.	Husk or woody fibre.	Starch, gum & sugar.	Gluten albumen, &c.	Fatty matter.	Saline matter.
Wheat,	15	15	55	10 to 19	2 to 4	2
Barley,	15	15	60	12 to 15	2 to 3	3
Oats,	16	20	60	14 to 19	5 to 7	4
Rye,	12	10 to 20	60	10 to 15	3 to 4	2
*Indian corn,	14	6	70	12	5 to 9	1½
Buckwheat,	15	25	50	8	0.4	4
Rice,	13	3	75	7	0.7	0¼
Beans,	14	8.11	40	24.28	2.3	3
Peas,	14	9	50	24	2.1	3
Potatoes,	75	4	18	2.0	0.3	1
Turnips,	88	2	9	1.5	0.3	½ to 4-5
Carrots,	85	3	10	1.5	0.4	1½ to 2
Mangel Wurtzel,	85	2	11	2.0	?	¾ to 1½
Meadow hay,	14	30	40	7.1	2 to 5	5 to 10
Clover hay,	14	25	40	9.3	3 to 5	9
Pea straw,	10 to 15	25	45	12.3	1.5	4 to 6
Oat straw,	12	45	35	1.3	0.8?	6
Wheat straw,	12 to 15	50	30	1.3	2 to 3½	5
Barley straw,	12 to 15	50	30	1.3	?	5
Rye straw,	12 to 15	45	38	1.3	?	4
Indian corn stalks	12	25	52	8.0	1.7	3 to 7

Some of the above numbers, are approximations, only, especially the fatty matter, which is very uncertain, and the buckwheat.

This table contains all we know of the composition of crops; you see that there is water in all this food. Wheat contains 15 per cent of water, the turnip from 88 to 90 per cent—showing the

*For an analysis of Indian corn, by J. H. Salisbury. see Transactions of 1848, p. 678.

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difference between grain and roots. The next column represents the woody fibre which animals cannot digest, and in which there is no nourishment. This in wheat and other grains varies from 10 to 20 per cent. Here are starch and sugar. Wheat contains about 55 per cent of starch; and here I must speak of this substance, for it affords us an exceedingly beautiful illustration of the relations of the plant to the animal, especially to the life of the animal, and again of the animal to the life of the plant. About half the weight of wheat consists of starch. So with barley, Indian corn, rice, peas and beans. Then all grains contain a substance analogous to gluten, but varying in this, that all do not contain the same quantity. Of this gluten, there exists in flour from 10 to 19 per cent, in barley from 12 to 15, in oats from 14 to 19, in rye 15, in Indian corn 12, in rice 8, in buck wheat 8, in beans and peas from 24 to 28, which is much more than is contained in any of the grains, and hence these produce the greatest effect upon certain functions of animal life. In the potato and the turnip it is very small, for nine-tenths of the turnip consist of water. Pea straw is very rich in it; all other straws are comparatively poor. Wheat and barley have little oil, oats from five to seven per cent, Indian corn five to nine, beans and peas from two to three per cent. Therefore these latter are deficient in oil. You find, going down, the quantity is small in the roots. So with the straws, they contain but little oil. Prof. J. here pointed to a diagram, showing the quantity of saline matter in the ash of different straws. Now there are two things of which I must remind you: 1st, that of all these different kinds and forms of matter which exist in all plants, but in different proportions, gluten, starch and oil are largest in the grains. Starch is the largest in the grains, gluten larger in the grains than in the straws, except pea straw, and is largest of all in the beans and peas. Oil or fat is greater in the seeds, and especially certain seeds, cultivated for food, greater in the oat and Indian corn than in other plants. Linseed I shall speak of, though this is cultivated for the oil and not for food, yielding about 60 per cent of it. Now these substances exist in all foods in different quantities. But how are these substances formed in the plant? where does the plant get them? This inquiry renders it necessary for me to make you acquainted with a principle of great importance to a clear understanding of the relations of different kinds of animated nature, one to another, the relations of the plant to the soil and of the soil to the animal. Time will not permit me to introduce some interesting substances existing in the soil from which plants are enabled to build up these kinds of food. But I will remind you, by way of illustration, of an experiment made at our last meeting. I took a little limestone and

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poured on it a quantity of acid; I now repeat that experiment. The effervescence is owing to the evolution of a kind of air called carbonic acid gas, one property of which was that it extinguished a taper when put in it; another was, that it could be poured out from one vessel into another; it is called acid, because in reality it is sour to the taste. This carbonic acid consists of two of the elementary substances of which I have spoken, carbon and oxygen. This carbon exists in plants and forms a large portion of the wood, as the gluten and starch and fat do, of the seed.

Perhaps you will recollect that I explained the structure of the leaves of plants, and showed how the under side, particularly, was studded with numerous pores or apertures, through which the plant sucked in certain substances from the air. I told you at our last meeting, that the leaves of plants, spreading through the air and exposing the large surfaces to it, sucked in this carbonic acid gas, which exists in the atmosphere in a very small proportion. This table, (pointing to a diagram) represents the proportion of carbonic acid gas which exists in the atmosphere. You will see that but one gallon of this air exists in 2,500 gallons of atmospheric air. The leaves of plants, through these little pores, suck out this gas from the atmosphere, in order that after undergoing certain chemical changes, it may serve to build up the substance of the plant.

What are these chemical changes? The plant sucks in the carbon as long as the sun shines. This carbonic acid gas consists of carbon and oxygen, and the plant sucks it in while the sun shines; but the leaves, at the same time that they suck in the carbonic acid, discharge very nearly as much oxygen, as they take in of oxygen in the form of carbonic acid; that is, if the leaf sucks in a given volume of the two gases combined, it discharges the whole of the oxygen which it contains, and retains the carbon; therefore, the function of the leaf is to suck in carbonic acid and throw off oxygen; to retain the carbon and throw off the oxygen. But it retains the carbon, not as charcoal; on the contrary, the plant exhibits green leaves, having no appearance of charcoal about them. But it undergoes certain chemical changes, the result of which is, that the oxygen is given off, and the carbon becomes a new substance. That is one source from which the plant derives the food, out of which the different substances in the table are formed.

This illustration of the way in which leaves take in sustenance from the atmosphere, shows you the mode in which plants, through the roots, as well as leaves, take in their food and convert it into another form of matter, the result being a change of what is thus taken in, into

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starch, gluten and fat, which are found in all plants, and which are important to the nourishments of animals.

I shall not dwell on this now, but come back to it before I conclude, having made you acquainted with the fact, as far as necessary, to enable you to understand the general principle I wish to fix on your minds, in regard to the composition of plants. I now draw your attention to the composition of animals.

If I take any portion of an animal, for instance, the end of one my fingers, and burn it, a large portion will burn away, and there would remain behind, also a large portion. The larger portion of the finger, the bone, would remain, in fact, being nearly the whole of the original bulk. So, if I take a piece of flesh, and cut off a bit of this muscle, excluding both the fat and the bone, and burn it, I find that a large portion burns away; but there remains a quantity of ash. Here we find precisely what we find in burning the plant. Every part of the plant which burns, leaves behind it, a mineral matter or ash. So it was with the soil, and so we find it now with the animal. These general relations between the soil, the plant and animal, all resolve themselves into the fact, that all of them consist of a part which burns away, and a part which does not; of the soil, the part that burns away is small; in the plant, it is very large; but in animals, we find both of these conditions; the soft parts of the animal, bear a similarity to the plant, in that the quantity which burns away, is greater than what is left; but if you burn the bone, there will remain a large quantity of mineral matter, the ash of the bone is greater than what burns away. Thus a quantity of mineral matter is left by every part of the animal which is burnt, and the quantity varies with the part of the animal which we burn. But I do not dwell on the mineral substance left. I draw your attention to the organic part that burns away. Look at this piece of beef. Here are three different substances; the muscle, or red part, the fat, and the bone. Now, in every part of the animal, leaving out the viscera, you find these three forms of matter exist; the fat, the muscle, and the bone.

Consider these different substances. The fat has a strong analogy to the fat existing in plants. If I take a portion of the fat—the suet as it is called—and put it under a press, I can squeeze out oil, which shows that in this solid fat, liquid fat is present. From this, candles may be made, soap &c. I have said that this is analogous to the fat in plants. Take olive oil, for instance; in winter, it becomes a solid lump of fat, but, put it under a press and you can squeeze out an oil, that will not freeze, and it will leave a substance, that is oily and that will

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remain solid even in the summer. Here you see the analogy between the fat of plants and that of animals. The solid fat of olive oil is the same as the solid fat of animals. If I eat olive oil, I eat solid fat, precisely like that of my own body. But I pass over this, believing that you will concede to be true what I cannot explain further—that the fat of all animals has a relation to the fat of all plants.

Now take this muscle, colored by blood—cut it out and wash it with water, until you wash out all the blood, you get a perfectly white substance, which can be drawn or torn into fibres. This is called fibrin. Now this fibrin is almost identical with the gluten of plants. Here then, is another analogy between the plant and the animal. Therefore, as the fat of animals is found to be identical with that of plants, so the muscle of animals is almost identical with that part of the plant called gluten.

But how with the bone? In plants there are no bones, we have a hard substance, which is not bone but which is sometimes very hard, as the wood of ebony. Burn the wood of plants and you have a small quantity of ash; burn the bone of animals and you have a large quantity. In tracing out the analogy between plants and animals, let me draw your attention to the bones of animals. Here is the bone of the ox; the cartilege will burn away, one third of the dry bone will burn away. Now of the phosphate of lime 57 per cent exists in the bone—phosphate of lime consists of phosphoric acid and lime. You recollect, I told you that phosphoric acid and lime both exist in plants—and in the ash of the grain of wheat, to an amount equal to one half of the whole bulk. You see therefore that we have in the bone and the ash of the bone, those substances which seem to form the largest proportion of the mineral matter existing in the different kinds of food that we eat, and also in the food for cattle. Where does the animal get these substances forming the different parts of the body—the muscle, the fat and the bone? It is obtained from the food which is eaten; but observe, that whilst the plant draws from the soil and from the air, one form of matter, and converts it into another, as for instance, carbonic acid gas—does the animal do it? No: on the other hand, the animal takes in, not the raw material, as it were, but the material already produced by the plant—the animal takes in this gluten, in the form of bread or grain, which gluten is almost identical with the solid part of the muscle. The animal also takes in fat with its food. Whether we eat vegetable or animal food, we take in fat substances closely related to the fat of our own bodies; and in regard to the bone, we take in food that contains the material which forms the mineral matter of the bone

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itself. Therefore, though the plant bears this relation to the animal, the plant could exist without the animal, but not the animal without the plant. The animal could not suck in the atmosphere and convert that into the solid parts of its own body—it is so ordered that the plant drinks in from the air, certain substances, and certain other substances from the soil, which are necessary to its growth, just as we would take a purse from the pocket and select a piece of money taking out of both, what it wants, and nothing more. So when food is introduced into the stomach, it is immediately placed in contact with the digestive organs, which perform the same office for the body, as the leaves do for the plant. The stomach has its peculiar functions and selects from the material that the plant has prepared, the very things which are needed to build up the several parts of the body, which require to be built up. But there is a difference which I must explain, I have shown a strong analogy between the plant and the animal, we have seen that both contain fat and gluten. But I said I would draw your attention more particularly, to these substances. Starch, we find, exists in wheat, to the extent of half the weight of the grain, and we eat with our food, a large quantity of starch. Is there any starch in the human body? No! Here then is the striking difference to which I have alluded. We find that in this food, which is supposed to be especially made to sustain the human family, viz: the grains, we find starch forms nearly half of the whole bulk. What is the end or purpose of this? To understand this, it is necessary to explain one or two functions of the animal.

Living animals perform various functions. The food they eat is digested; that is the most important function; but we cannot compare the importance of one function with another, in the living animal; for if any one function ceases to be carried on, the animal ceases to live. But what is the distinction? First of all, the food is dissolved in the stomach, and by means of the organization of the stomach, the animal selects from it, the materials necessary for such parts as need it. But the animal breathes. Stop our breath, and we could not live a moment. What is the effect on animal life, of breathing? Here is the difference between plants and animals. Compare the composition of air, before it goes into the lungs, with its composition, when it comes out; you will find that the air comes out, charged with a greater quantity of carbonic acid gas, than when it went in. In its passage through the lungs, the volume of this gas is greatly increased. This carbonic acid comes from the blood of the system; it consists of carbon and oxygen, and is obtained from the food. The animal, in fact, draws in air, and

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throws out air of a different composition; the oxygen is diminished, and the carbon increased.

Of what does starch consist? Of carbon in large quantities. When the leaves draw in carbonic acid they throw off oxygen; the carbon only remains, and that in a new state of combination; it forms starch among other things, by uniting with water—starch in fact consists of carbon and water only—so that in forming starch the carbonic acid unites with water in the plant. It forms starch, which the sap of the plant conveys to the part which requires it. We find it largely in the seeds. Now, the function of the leaf is to change this carbonic acid and form starch. The animal takes this starch into the stomach and decomposes it, and it escapes from the lungs in the state of carbonic acid and water. I say water, for if I take a clear, dry glass and breathe into it, it makes it opaque; the moisture of the breath being condensed upon the cool glass. The lungs, therefore, are continually throwing off carbonic acid and water, and these are thrown off at the expense of the food which the animal eats; that is, the starch which is conveyed into the stomach in the form of food, is by certain animal processes, converted into carbonic acid and water and thrown off by the lungs. If I take a piece of starch and kindle it, it will burn much like wood, and give out heat and light; and when it gives out this heat and light it is converted into carbonic acid and water, or into the same things exactly as it is by the respiration of the animal. Thus the functions of animal life convert starch into the same substances as when we burn it.

You will ask, what is the purpose of all this? The plant sucks in carbon and water, and the animal takes it in in the shape of food and discharges it again in the same form. Is this designed for the mere amusement of the animal? No; the purpose is this: animals require to be kept warm, and among the means to keep up warmth one is the application of external heat. It is also kept warm by its food. The animal that is stationary will keep itself above the temperature of the air without the application of heat, because the animal has within itself a source of heat; and just as when starch is burned it gives out heat, so in the interior of the body—though it does not burn as rapidly, and gives no light—yet it undergoes a slow chemical change, which is known to produce heat, that keeps the body warm, and thus starch serves to keep up the animal heat. That, at least, is the present opinion. The animal takes in this starch with its food, the plant mixes it up with what the animal eats. The animal must eat starch with other substances, and thus the animal cannot eat what will not supply the materials to enable it to discharge all the functions of the body. Na-

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ture mixes up these things in order that respiration may go on, and that the animal may be kept warm, and provides also that the plant may undo what the animal has done, and thus renew the substances necessary to keep up the animal functions.

You cannot fail to see how very beautiful this cycle is. Here is a continual operation going on, by which the carbonic acid and water of the atmosphere are converted by the plant into food, one of the component parts of which is starch, and by which it is again returned to the atmosphere, in the state of the same carbonic acid and water. But there are larger cycles than this, on which the existence of animal life depends.

To advance one step further: You see now the reason why it is that the plant differs from the animal, in that it contains this large quantity of starch. But what is the relation of other kinds of food that the plant contains, to the animal? What is the function of gluten, or that substance which we have found to be nearly identical with the fibre of the muscle? When the animal eats vegetable food, it eats a portion of this material, which is so nearly identical with its own muscle. You understand, no doubt, that if certain parts of the animal are building up or increasing, why it is necessary to give it continual supplies of that substance, from which the muscle is built up. If this is what supplies the growth of muscle, you might say that if the muscle is fully formed, it is not necessary to keep it up; that if this substance is introduced into the stomach, and the gluten is selected which goes to form the muscle, that the gluten, in such a case, is not wanted. But this is not so; this law exists, though the body may appear to be identically the same, yet it is continually changing and undergoing renovation in different parts. There are certain parts, of every portion of every animal, removed every day, and a quantity of new material put in its place, so that the body is kept up by the continual addition of new matter.

The way this takes place may be thus illustrated: Suppose you have a scar that has remained as far back as you can recollect: if this doctrine be true, that the whole body is renewed once in five years, you may well think it curious that this little mark should remain so long, without any apparent change in its appearance; but it is in fact, engraved as it were, not on the matter originally injured, but on other matter. You can understand this, by this simple illustration: Suppose this building to be of brick, and that every day some small part of it is taken out, a brick from this or that place and a new one put in, until the whole building has been renewed, and yet no apparent change in it beyond the color of the new material; for you can conceive how such a

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process might go on, until every part of the building had been replaced by other materials; and yet the building remain a complete building in all its parts, its interior accommodations and its outward proportions. This is constantly taking place in your body; from every part of it a portion is removed every day, more or less, according to the quantity of material taken in, in the shape of food. Hence, the animal should have a constant supply, in order that this daily waste may be made up. An animal requires to sustain its body in good condition, or to supply what is called the sustaining food, about one-sixtieth part of its own weight, and to keep it in condition, one-fiftieth or one-sixtieth part of its own weight, every day, to sustain its daily waste. If you want to give it food, to increase its size, to enable it to do work, or to produce milk, then you must give it more food. If you feed it for milk you must give it twice that quantity. You must adapt your food to the points for which the animal is fed, and you can do this, for the art of feeding animals with a view to certain results, is one of those arts which science has given to the farmer. If I want to lay on muscle, I must give food that contains gluten, and looking over this table (pointing to a diagram) you will see that beans and peas contain this in the largest quantity, and you know how important an article of food beans and peas are for horses and cattle, particularly for working horses. Cabbage contains about nine-tenths of its weight of water. Wheat, 35 or 40 per cent of gluten, or of this matter from which muscle is formed. The flower of the cauliflower contains more of gluten than any substance we raise for food. If you want to lay on fat, you will give the animal food that contains more fat, such as Indian corn; so if you want to give it a good coat, you will give it oats or Indian corn. You can make an animal fat by giving it fat, but in general we select seeds or grains, such as linseed, that contains a large quantity of oil, sometimes twenty per cent. Rape-seed contains 70 per cent, and poppy-seed contains a great per centage of oil. In Flanders and France and other parts of Europe, it is cultivated for its oil. The cake which is left after expressing the oil, is exceedingly nourishing, and can be used advantageously in feeding cattle. This poppy cake does not contain opium enough to hurt an animal; when seed-cakes are employed to feed animals, oil cakes are imported for this purpose. Here is a table of the composition of oil-cakes. Three different varieties can be made. This oil-cake contains what forms muscle and fat, and farmers know that to lay on muscle and fat, it is a most profitable kind of food. But the animal is often fed for milk. Now milk has three different qualities. The milkman

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wants quantity and not quality, and therefore he gives his cattle grains from the brewery—drinks of various kinds and water—and if he finds, after all, that the milk is too rich, he puts a little water in it [laughter.] But where the dairyman wants butter or cheese, then he wants quality. If he makes butter, the milk should be rich. He can add largely to the ordinary produce of the dairy, by the selection of food, rich in oil. In England, we give them oil-cake, but not much at a time, as it gives an undesirable taste to the butter; but this is the result rather of inexperience, for the skilful dairyman, finds he can give a large quantity of oil-cake and get a far better quality of milk than by giving any other food. So if he wants milk for cheese, he gives the food that is rich in the material to produce curd—that is precisely the food that produces muscle—and when I tell you that that which produces muscle produces the curd in the milk of the cow, you then have a clue to the mode in which animals should be fed, when you desire to produce certain results. If I want a poor cheese, I would give the animal cabbage, which contains little fat, but a large quantity of the muscle-forming or curd-forming material—it produces a milk poor in cream and butter, but rich in the material that forms curd. But if I desire milk for butter or rich cheese, I give more fat, and of all the materials that we know of, linseed oil-cake is the best.

I do not dwell on the feeding of animals, for growing young calves. When the animal is growing it is necessary to adopt the food to its condition. You must give it such food as is necessary to increase the bone. The cow in calf must also have a supply of food in proportion to its condition, so if you are rearing young animals you must give food to preserve the milk of its natural consistency, but we in England feed animals with a view, merely, to fill up the farm yard with manure. The farmer does it not for profit in such cases from his animal, but from the richness of the manure. Under all circumstances the kind of food should be selected with reference to the result of analytic research, and according to the purposes for which the animal is fed—regarding also the food which is the cheapest in market or which is most readily within reach.

One of the circumstances, (for I have but five minutes more and must hurry over this part of the subject)—it is of great importance to attend to, the state in which the food is introduced into the stomach. If I select Indian corn without mixing it with other food, the animal cannot digest it readily. So with other food, this shows how important it is, that the food, whatever its composition, if it is to produce its full feeding effect, should be given in such a state that the animal can avail itself of it. The feeding

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of animals with prepared food, is a branch of knowledge which has resulted in great profit to the farmer. A mixture of different kinds of food is better than one kind; better, because it is of different kinds, than because it has different compositions, and by mixing food we are more likely to meet the wants of the animal. When food is mixed with cut chaff, it is far more nourishing; in short, food goes further, and performs its functions more effectually, when mixed up in this way. Now, you have all heard of malt being used in feeding stock; malt differs from ordinary barley from its being sprouted a very little, and dried. Barley contains starch and gluten; when it sprouts, a certain quantity of gluten changes its character, being converted into a substance soluble in water. If you take malt and crush it, and put it into water, the water will dissolve out this substance, which is found at the root of the germ; and the water, when poured off, will dissolve starch. Put starch into water and it will not dissolve, but it will dissolve in this water thus poured off. Take malt, then, as prepared by the brewers, and put it into the food for cattle, and it performs in the stomach the process of dissolving the starch in the food. This is a reason, not why malt is not more nutritive than barley, but why malt may be profitably used when mixed up with other food, as it expedites the conversion of the food into a liquid form, and is more nourishing.

I should have made you acquainted, had I time, with another thing, and that is the influence of the circumstances in which the animal is placed on the effect of his food—such as the influences of warmth, shelter, ventilation, quiet. All these circumstances have a great effect on the influence that the food which he gets has on the animal. I have a table of the effects of warmth and shelter, made up from experiment, and showing results of the character which I have intimated; but I have said quite enough to show you that in addition to the state in which the food is given, which modifies the effect of that food, the circumstances in which the animal is placed make the food more or less nutritious. I think you cannot fail to have seen in this interesting department of science, which I have merely run over—for the time would not permit me to go into the details—is not only one of great importance to the practical farmer, but as worthy of his consideration, and as closely connected with the development of Agriculture, as an art, as any of those branches which it has been my happiness to lay before you.

To-morrow night I shall show you, how the pursuit of this branch of study throws light on the common practical operation of the farmer in improving the soil, by manures.

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LECTURE EIGHTH.

RELATIONS OF CHEMISTRY TO THE DOCTRINE OF MANURES.

GENTLEMEN:—The subject of the lecture this evening is, The Relations of Chemistry to the Doctrine of Manures, or in other words, the improvement of the soil by chemical means. You will recollect, after I discussed the composition of the soil, and showed you, that when fertile it contained always certain substances in various proportions, that I then drew your attention to the modes in which the soil might be improved; that I stated there were two methods of doing this, one mechanical, the other chemical, and that I discussed the mechanical method, which consisted chiefly in deeper ploughing, subsoiling and draining. The improvement of the soil by chemical means, is more important, though no one result is more important than another to the farmer, except as one is more profitable than the other. It is quite certain, that no chemical improvement whatever, can result in higher profit than one or other of the mechanical modes I have stated: ploughing deep, subsoiling and thorough drainage. Still, supposing the soil to be already improved in this way, then come in the new, or chemical methods, by which it can be still farther improved, and it is one of those indirect advantages resulting from thorough drainage, that after it has been introduced and the soil made dry, you can then employ the means which chemistry puts within your reach. But if not thus improved, chemical means often prove ineffectual.

As to the chemical mode, it is what we understand by manuring, and by manure, we understand anything that feeds the plant, and corresponds with the food given to animals. Now, to understand fully every substance employed as a manure to feed the plant or prepare food for it, we must know what a manure should contain, and why it should contain these things. But as preliminary to the answer to this question, we must inquire what kinds of food the plant needs, if the object or purpose of manuring be to supply food to the plant. Thus, if we know what food the plant requires, then we know what manure is to be put on. I explained the evening before, that the plant consists in great part, of two forms of matter, one of which, and by far the greater part, was the organic form of matter, and that the inorganic or mineral part

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was the smaller portion. In explaining the organic part, the starch, gluten and fat, and the woody fibre, I told you that there were certain elements of these substances, which the plant derived from the air, in large proportion, and certain other elements from the soil only, and that of those elements derived from the air, nitrogen was one only. I told you that the mineral part or ash, is wholly from the soil. Now, all manuring is applied to the soil; therefore, whatever the plant draws from the soil, these substances or manures should contain; and the first thing we must study in regard to manures is, what they should generally contain, if they are to make all plants grow under all circumstances, for we may have a very barren soil, and which itself would produce no crop whatever, as you recollect I showed you on a previous occasion. Now, on such a soil, if you apply a manure which shall make any crop grow, then you know, it should be such as should bring it up to the kind of land called fertile. These general manures should combine all that a plant requires to build it up, the nitrogen, which I call gluten, and these mineral substances, lime, potash, magnesia, phosphoric acid, and chlorine. All these substances, this manure must add to the soil, if it is to make plants grow under any circumstances.

In considering the different kinds of manure, our attention is drawn to three different classes of substances, which naturally present themselves in divisions: 1st, vegetable manure; 2d, animal; 3d, mineral. The one derived from vegetable substances, another from parts of animals, and the mineral, from the substances occurring in nature, or which can be extracted from rocks; and there is a fourth class, more important, perhaps, than all; those which result from the application of science to this subject, viz: the artificial manures, which are compounded with reference to what we know to be the wants of the plant. Let me draw your attention to these manures, with this preliminary observation, however, that though we arrive, from these considerations, at certain conclusions, as to what the plant requires always, that is certain organic and mineral matter; yet we cannot be sure that certain vegetable or animal or mineral substances contain them all; but we can be certain that those manures, which we make up, shall contain them all. As to the several kinds of manures; and 1st, the vegetable manures. They are applied 1st, in the green or in the dry state. Green manuring is the turning into the soil vegetable matter which is growing; as when a crop of clover is ploughed in, or when the sward is ploughed up, and the grass buried, or when green crops, grown for the purpose, are left to decay; for crops are often sown for the mere purpose of ploughing them in. Liguminous crops are very good; clover is

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very good; lupines are cultivated largely in Europe and sold for manures. The crop is ploughed in before it ripens. So in northern America, buckwheat is sowed for a similar purpose, and many other plants are sown, to be turned in for manure, when in a certain state. This is one of those methods, within the reach of every man, and which in this country may be used to advantage when the land is exhausted. In many parts of America, where I have been—I do not refer to this State—these exhausted soils occur, and where the difficulty of obtaining these fertilizing substances, except from a distance, is very great. Hence, any method which the farmer has within his reach, and by which he can most easily restore strength to his land, must be the best; and this method of ploughing in green manure is very effectual.

How does this act? I have spoken of the lupine, which is analygous to peas and beans. You recollect that last night I showed you the composition of different crops, and among the rest, that of the bean and the pea. You will recollect that they contained 24 or 25 per cent. of gluten, and that even in the straw of these, there is as much gluten as in wheat. The nutritive quality of the straw, of the bean and the pea, would be as great as that of wheat; consequently, you see in this, one of those deductions, which the analogies of plants enables us to draw. The lupine has this quality; it is rich in gluten, containing, among other things, nitrogen, which it has taken from the soil only, and therefore if you bury it in the soil, you enrich it with this gluten, which is so important an element to the growth of plants.

Further—by ploughing in green crops, you introduce another element. You know that all plants contain mineral matter; the bean and pea contain considerable. The roots of a plant go down as far as possible, if the habit of the plant is that way. Beans and peas go down to a great depth, in search of food, and among this food, are the mineral matters of which I have spoken—lime, potash, soda, &c. The roots send this up into the stem of the plant; they bring it from below, above the surface, or into the stem of the plant. But in this way, they do not get into the material of the surface; but if you plough in the plant, you supply the surface, not only with nitrogen, but with mineral matter. Thus you employ the roots of the plant to bring up from below what you want, upon the surface. This is the philosophy of green manuring. It does not put anything new into the soil, but it brings up from below, and puts upon the surface that which renders the surface fertile.

But besides green manuring, marine plants are often used—such as sea weed. This is another form of green vegetable matter. It is used on the sea coast; and in Scotland, it is considered so valuable a manure

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that the right of way to the sea-side, adds a large additional rental an acre to lands. Now sea-weeds contain a large quantity of organic and of mineral matter. There is a table, (pointing to a diagram,) showing the composition of sea-weeds—that they contain about ten per cent of mineral matter. They are exceedingly rich in it, as you might suppose from their growing in salt water. They contain some 38 per cent of salt; phosphate of lime is also present in sea-weed; phosphoric acid also. In short, in this form of vegetable matter, we have a certain quantity of what crops require; so that if you lay it on land, or plough it in, it is found to be productive of great benefit.

Besides these forms of green vegetable matter, there are many others, which I pass over; but it is often applied in a dry state. You know there is a form of vegetable matter, such as the husks of grain, known as bran, which is given to cattle, pigs and other stock, for food, as well as to fatten them. This bran contains much mineral and organic matter, of a very rich and fertilizing kind, and hence it is often applied, instead of feeding it to stock, as a manure, and is found to be very beneficial to land, causing it to produce very good crops. But there is another form of dry vegetable matter, used with us, as a manure; it is one of those substances I spoke of last night, viz: the cake that is left when oily seeds are crushed. This cake contains all the remainder of the constituent parts of the seeds, the composition of which, I showed you last night. The linseed cake is too valuable to be used as a manure; but the rape cake, which cannot be much eaten by cattle, is extensively employed as a manure and with great effect. Perhaps I may use this as an illustration of the mode in which our farmers profit by high manuring, and though it may seem to partake of the nature of speculation, it is an adventure which is certain in its results. Suppose here are two farmers, occupying two farms, cultivating each 40 acres of wheat. The one ploughs and manures his land in the ordinary way, and the wheat comes up like his neighbor's; the other, after ploughing and sowing, leaves the rest to providence. He does not trouble himself, except perhaps to take out the weeds, leaving his crops to the influence of the seasons. But the other man does more; as soon as the grain is up, or when it begins to shoot, he applies a quantity of rape cake. This is over and above what the other man does to his land; and for his crops, he gets perhaps 50 shillings worth of wheat for 40 shillings worth of rape dust—besides a great quantity of straw. This is the way in which our farmers, by high farming, make money. It is laying out money in fact, to get it back with interest in another form; and you will readily see what I have often seen, wherever I go, that the man who farms highest, makes the most money.

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I pass now to the subject of animal manure. This is of various kinds, consisting of parts of animals; blood and flesh are often employed as manure. In some parts of the world it is dried, and sold in a dried state; sometimes it is dried by artificial heat, and applied in a dry powder, and is an exceedingly fertilizing substance. So with the flesh of animals; dead animals are often buried, as a manure. So the refuse of animals is employed, more or less, as a manure. You know the composition of the muscle of animals: it contains 77 per cent. of water—a solid beef steak contains that amount of water. It will surprise you, perhaps, to know that the blood in your veins, as well as in animals, contains the same quantity of water that the muscle does, and differs from the flesh in no degree. Dry flesh has exactly the same composition as the blood. Burn them both, and the mineral matter left is nearly the same. The ash of the blood and of the flesh contains phosphoric acid and phosphate of lime in large quantities. Both, therefore, are extremely fertilizing, as they contain the mineral matter that the plant requires; and the organic matter that burns away is identical with the gluten of the vegetable, and supplies the nitrogen of which the gluten is built up.

Fish, in many parts of the world, are employed as a manure. On the sea coast in this State, and other north-eastern States, fish are employed extensively as a manure. Muscles, in England, are often buried in the soil as a manure. Sprats, also, are obtained in great quantities, and employed in the same manner. Among other interesting things I have learned in the State of Connecticut, is the fact that fish are obtained there in large quantities, and are now manufactured into a fish cake. The oil is expressed, and the cake is dried, and is found to be exceedingly fertilizing, consisting of animal matter and bones, with a little oil remaining in it. I understand that it is intended to export it to Liverpool. I believe it will find a ready market there. Shell fish are another form of animal matter, applied as a manure. In some parts of northern America, the muscle is found in great abundance in the mud banks on the coast. In England, we use them as I have said; so on the coast of New-Brunswick and on the borders of Maine. These muscles are obtained and ploughed in. So with sea mud; that is a fertilizing substance. I have explained to you, in a previous lecture, how it is that this alluvial mud is so rich, and you will recollect how large a quantity of animal matter it contains.

But among the forms of animal matter most extensively employed in England, where Agriculture forms a species of trade or profession, which is pursued with great intelligence and skill, are bones, and they are ap

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plied with great benefit. Hair and woolen rags are different forms of the same thing. The animal matter of the bones is exceedingly rich in nitrogen, and capable of supplying those substances which the root of the plant can take in and enable it to build up the gluten, of which it so largely consists. I shall presently discuss the use of bones in various forms, when on the subject of mineral manures. The farm-yard manure, as it is called, the compost which the farmer applies to his land, is another form of manure, which is very rich when properly treated. It is often poorer than it should be, owing to a want of attention to his own interests which the farmer sometimes exhibits. I cannot enter now into the mode in which this manure is employed; but will make one observation in regard to it. When it ferments, the straw and other such matters contained in it, become more soluble, so that when the rain falls on it, the liquid that oozes from it is exceedingly rich in all the fertilizing substances which the heap contains, especially the phosphoric acid. Here is a table, (pointing to a diagram,) showing the composition of the draining of such heaps. It contains mineral matter in large quantities, the phosphate of lime greatly predominating. But I pass over this, and I draw your attention only to two facts in regard to the manure produced in this manner: First, as to the effect which the kind of food which the animal gets, has on this manure. I have said that to sustain the body of the animal when full grown, or to build it up when not full grown, or to increase the muscle for the market, the food which the animal gets, supplies certain materials; but that after these materials are taken out, by the operation of the stomach, all the rest is rejected by the animal. Now, if the food is very rich and supplies more of this nourishing matter than the body requires, the richer the droppings of the animal, and the richer the manure of the farm-yard, than when the contrary is the case. This is so well understood by cattle feeders and those who have poor lands to cultivate, that they feed cattle high, simply to produce a rich manure. This is done, not directly for gain, though the cattle are sold to the butchers, for they often do not pay for the oil cake on which they are fed.

Our Norfolk farmers sometimes feed out a ton of oil cake a day to their cattle; not to make money by the sale of the cattle, but indirectly, through the richness of the manure obtained by it. In Lancashire, where there was a large tract of very poor land, which thirty years ago was a complete moor, in the middle of which was erected a high tower, so that the traveller might know where he was, this great moor is now reclaimed and cultivated, and pays 20 shillings rent annually, per acre. But it is kept in this state of cultivation by this high

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farming. They keep cattle, feed them with oil cake, and though the cattle may not be worth half the oil cake used in feeding, yet they obtain in this way a manure, which enables them to raise barley and wheat crops, sustain their families, pay their rent, and lay by something.

Another consideration, is the form in which the food is given to the animal. I explained last night, that feeding is carried on with most profit, when the food is prepared, various kinds being mixed up together. That is found to cause the oil cake to go further in the production of a rich and bulky manure. Here let me call your attention to an important point. You know that from an early period it has been taken for granted that vegetable substances are richer as a manure, after passing through the animal, than when applied in their natural condition. If you take a ton of the droppings of the horse and the cow in a fermented state, it is far more valuable as a manure, than a ton of the substance with which the animal is fed, though it be oats, or other rich food. Every man knows that. Now, this fact was early presented to me for an explanation, and having satisfied myself of the fact, the reason suggested itself. I have shown you that all the different kinds of food given to animals, contain a certain amount of mineral matter, which the plant contains; it contains that form of matter, called gluten, which is rich in nitrogen and starch also. Suppose an animal is fed on wheat, which contains a great quantity of starch, gluten and mineral matter; but when the animal undoes what the plant had done, that is, converts the starch into carbonic acid and water, by the action of the lungs, it separates the starch, which in wheat forms more than half of its weight, and all the other matter—the mineral matter and the gluten, become changed into another form of matter, and what the animal rejects, is richer in saline matter, and in the material that contains nitrogen, than the food in its original state. It contains double the quantity of nitrogen. This is a very beautiful and interesting fact, showing that by the digestive organs of the animal, you can obtain a manure richer than the vegetable and green food, if applied directly to the surface. Another point: the animal grinds down the food into a minute state with its teeth, and it is thus converted into a substance more available to fertilize the soil, than the dry straw or hay which it eats, if applied directly to the soil without mastication.

Among other forms of the droppings of animals, those of birds are employed in large quantities. But among the kinds of this form of matter, most extensively employed, is what is called the guano. In

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England, something like 100,000 tons of South American guano are used every year. It is imported at a large expense, and the demand for it is such, that the islands near the coast of Africa, and other parts of the world, from which it was first taken, have become exhausted. The value of these, as a manure, depends on their containing a large proportion of mineral matter, and of that matter which supplies nitrogen and ammonia. Here is the composition (pointing to a diagram,) of the different kinds of guano. The South American, it will be seen, contains, besides animal matter, ammonia and phosphate of lime, to the extent of 21 per cent., so that it is very rich. There are some varieties of guano, particularly one found at the Cape of Good Hope, containing 70 and even 80 per cent. of the phosphate of lime, the animal matter having disappeared by the action of the weather.

I pass on to the subject of mineral manures. Of these, first I shall speak of phosphate of lime. I showed you a certain form of mineral phosphate of lime, which was capable of being applied to the fertilizing of land. This phosphate of lime is brought in the form of bones, from abroad. These bones are boiled, crushed, and sold in the form of dust which is applied to land, and found to be exceedingly fertilizing. These bones contain about 33 per cent of animal matter or cartilage, which will burn away, or when boiled forms a glue, phosphate of lime and magnesia. These bones therefore are fertilizing, because of the animal, as well as mineral matter contained in them; hence they will raise good crops where mineral phosphates would not, for if the plant requires organic as well as mineral matter, these bones supply it. But if the soil is rich in the form of organic matter which supplies nitrogen, then mineral matter alone without the animal would be more suitable; but if the soil be poor in both, then bones are better than either animal or mineral matter alone. This is the explanation of the failures of a trial of phosphate alone, or of burnt bone alone, instead of the natural bone. Some have found one better than another, and persons who have found the mineral part to produce good effects, have assumed that, that is the only fertilizing substance in the bone—others, have found the converse to be true and the two classes are at loggerheads about it. But both are in fact, consistent with each other; for the bones contain two elements, both of which are necessary and valuable, and either of which, under certain circumstances will be found to be so. Bones are applied, not only in a crushed state, but in a fermented state, and on the principle that if the food of an animal must be in a state in which the animal can digest it, so if you put into the soil any substance on which the plant is to feed, it must be in a condition to be dissolved by

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water, and thus capable of entering the roots of the plant. That this may be so, bones are boiled and applied to land, in that state, for it is found that a bone when crushed will remain for years in the land, apparently unchanged. In Manchester, bones are used in the manufacture of glue, which forms a sizing for fabrics. The bones thus boiled come out soft, full of water. They are then easily crushed and decompose easily when put into the soil. But to secure the easy dissolution of bones in the soil, fermentation has been introduced. The crushed bones, being mixed up with earth and allowed to ferment until the mass is reduced to a fine powder. This method is found greatly to facilitate the growth of crops. Thus a small quantity of the dust, goes farther than in the other form. But, there is one form in which bones are used with great profit—that is, when dissolved in sulphuric acid. The pulp is dried, sometimes mixed with gypsum, powdered and applied to the growth of turnips and with great effect. In England and Scotland, it is the only manure for the turnip. But these dissolved bones are applied as a top-dressing for wheat and other grain, and when strewed over the surface are found to be very effectual. I may mention one instance, where 600 weight of dissolved bones were applied to a crop of wheat and the product was raised from 29 to 53 bushels an acre. Farm yard manure applied under the same circumstances, raised the product to within 6 bushels of that amount per acre. This is an illustration of the superior effect of this bone manure. Bones are applied in this form to the grass lands of Cheshire, and with great profit. The lands there have been under dairy husbandry for many centuries. You will recollect, that the substances contained in milk when burned, are some of them, the very materials which the bones leave when burnt. The cow extracts them from the soil on which it feeds, and it appears again in the milk, as is found by analysis. This has been going on for centuries, and this continual drain of the soil, going on, it became impoverished. But the application of the bone, was found to produce remarkable effects in restoring the soil, though the principle was not understood. The explanation however, is found in the fact, that the milk and the bones, contained essentially the same substances, and that the latter restored to the soil, what had been taken from it by the animal. Here you see an illustration of the application of the knowledge acquired by the analysis of the bones and the milk, to practical husbandry. The discovery of the value of this kind of manure, applied to the grass lands of Cheshire, may be estimated from the fact that lands which once paid but 5 shillings an acre of rent, have been made to yield 40 shillings rent, besides a good profit to the dairy-

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man. You see from this, how important it is to know the effects of certain kinds of husbandry upon land. Dairy husbandry produces a special exhaustion of the soil, and knowing this, and what substances have been taken out of the soil and carried off in the shape of milk, you know what to put in to reclaim it.

I have alluded to the circumstance that mineral phosphates are found in certain geological formations, and the mode in which they are employed, when dissolved in sulphuric acid, as a manure. This is manufactured and sold with us, under the name of super-phosphate of lime, and, as I have told you, it is made and used with great profit, both to the manufacturer and the farmer.

Among the other mineral manures, this consists only of phosphoric acid and lime; but among the mineral manures which supply the plant with all that it requires, I have a fourth class, of artificial mineral manures, which can be made by putting together the substances which the plant is found to contain. The tables which I have shown you exhibit, in the composition of different crops, the mineral matters which they take from the soil. I contrasted the exhaustion produced by the tobacco plant with that produced by wheat and barley. Now, to restore land by artificial manures, which has been specially exhausted by either of these crops, I must make up a manure which shall contain the substances which they take from the soil, and in like proportions; and thus, by especial manures, I can restore to the land exactly what the crops have removed; or if I want to vary the crops, I vary the composition of the manure accordingly. In this second edition of my Lectures, (exhibiting the book,) the first of which has been printed in this country, I have published a series of recipes, by which special manures may be compounded for all the crops we are in the habit of raising, and which have been made up from the results of experience and analysis, and which you will find worth your attention.

Experimental Agriculture is a branch now in its infancy; but what has been done has been sufficient to excite inquiry and induce experiments, with a view to determine the effect of this and that substance, when applied to this or that crop, under different circumstances. These recipes to which I allude have been tried, but not always with success, because not applied with care. Now, to make any advance in this department of knowledge, we must have experiments made in the field as accurately as in the laboratory. I have taken up this subject, and had just prepared, before I left home, a book on Experimental Agriculture, a volume of which has been sent me here. It is a history or review of the experiments which have been made, and the suggestions drawn from them, as to what should be done to open up this new field

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of research. It is exceedingly interesting to find theoretical results practically exemplified and tested by actual experiment, as in the case I have mentioned of the application of bones to the grass lands of Cheshire. But after all, the result to which it is necessary to look, in these days, is that which shall enlist the largest number in favor of these researches, viz: the result which puts the most money in the pocket of the farmer. This is the point with reference to which experiments must be carried on. This will be the object of the succeeding volume of my book, in which the results of succeeding experiments will be given, in improving the condition of the soil.

I must pass over the application of lime as a manure, and several other matters connected with this subject. It is an interesting department of study. The subject of lime alone, of which I intended to speak, might form the subject of two or three very interesting lectures, but I cannot go into it.

Now you cannot fail to see from this course of lectures, the strictly scientific part of which I bring to a close this evening, that there is an exceedingly wide and extended application of science to the farmers' art, and that this is not merely theoretical, but has a positive and practical bearing upon the method by which the farmer may increase his crops and his profits. The four last lectures are more or less connected together, as the same chemical principles are comprehended in them all. You must have seen how closely connected are the different departments of the farmers' art, and how many beautiful relations subsist between that art and the connection of man with the earth on which he lives—the connection in fact, of all life, animal and vegetable, with the present state of things. You will recollect the interesting facts I have mentioned, showing the intimate connection between the circulation of the blood, and vegetable as well as animal life. You recollect the striking fact that the plant extracts the carbonic acid from the air and the animal destroys it, reconverting it into carbonic acid and water. Suppose this cycle should cease, and that either the plant or the animal should not perform these functions, it is obvious that all animal and vegetable life must cease. But in the larger cycle, viz: that subsisting between the soil, the plant and the animal, it will have been seen that the interruption of the functions of either would destroy all vegetable and animal life. There is a still larger view of this subject, which comprehends the contemplation of the earth as one of a system of bodies revolving around the sun; the sun traversing space and the earth, and all the planets accompanying it. As a member of the system, it is of no consequence whether its surface is covered with animal or vege-

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table life. All animal and vegetable life might cease upon this earth, and yet the earth continue its revolutions unchanged, and the system of the universe would not be affected. Gentlemen, we are not essential parts of the universe, but mere accessories, placed here at the will of the Almighty for purposes of his own, which we can, perhaps, in some degree fathom, and so far, it is our duty to follow them out. If the Deity has made all these things which adorn the earth, animal as well as vegetable, and above all has placed man as part of the system, I cannot help thinking, that it is His will that we should investigate them, and see if we can, why he has put them before our eyes and under our feet. These investigations furnish congenial employment for intelligent man, and result in substantial rewards. But among them none yield more substantial returns than those which belong to the intellectual cultivator of the soil, who studies nature in order to render the soil more fertile, and contribute to the happinesss of the human family.

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LECTURE NINTH.

MEANS BY WHICH GENERAL SCIENTIFIC KNOWLEDGE MAY BE DIFFUSED, AND MADE AVAILABLE FOR THE IMPROVEMENT OF PRACTICAL AGRICULTURE, AND THE GENERAL ELEVATION OF THE AGRICULTURAL CLASS.

GENTLEMEN :—I take it for granted, that you are all satisfied of the importance of scientific research to practical Agriculture. If satisfied of this, you must be also of the importance of diffusing a knowledge of the results of such researches, especially among practical farmers.

There are two objects we may have in view, in our desire to shed such knowledge. 1st. The improvement of the Agriculture of the State, or along with this, the elevation, intellectually and socially, of the agricultural community. All members of the community are interested in the first of these objects or ends, viz: the general improvement of the Agriculture of the State, and a large class are especially interested in the second, which looks to the elevation morally, intellectually and socially, of the agricultural community. In regard to the first of these objects, the general improvement of the Agriculture of the State, before we form any idea of what should be done, it is desirable to know what is the actual condition of Agriculture now. I must ask you to judge of the condition of Agriculture by the tests which I shall name. By the state of the roads in the agricultural districts; the kind of rotation practised throughout the State; the kind of stock reared, and the mode of feeding them; the extent of land uncultivated, or poorly cultivated, compared with the density of the population.

You can only obtain accurate notions on this subject, by actual observation. I have not seen enough of your State, to form an opinion of its agricultural character; nor have I any data from which to form an opinion, though I have heard and read much on the subject. But there is one mode we have within our reach, and of which I propose to speak, and that is, the average produce of the land. To a person unacquainted with the country, from personal observation, such data are generally very decisive indications of the state of its practical Agriculture; at the same time, it is necessary to take into consideration with the average product, the physical geography of a country, its geological structure,

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its climate, &c.; but supposing him to know all this, he could form an accurate notion of the agricultural condition of a country from its products, and by comparing these with those of other countries. I have the average product of New-York, as shown by the last census, which is the best data I have. The average product per acre of this State, as so shown, is of wheat, 14 bushels; of oats, 26 bushels; of barley, 11 bushels; of rye, 9½ bushels, and of Indian corn, 25 bushels per acre. These results are given as the average product of the State, in one of the volumes of your Transactions. In one of the volumes of Prof. Emmons' Natural History of this State, I find another series of averages, a little less than these; but I adopt the larger ones. Now, I believe there are few persons, acquainted with the early history of this State, who will not tell you that the average returns were formerly far greater than now. In fact, you may judge what the product of New-York once was, from the present product of New-Brunswick. According to returns, the average product of that country is of wheat, 19 bushels per acre; of oats, 34 bushels; of barley, 29 bushels; of rye, 20 bushels; of Indian corn, 41 bushels per acre.

Now, I can very well judge of the former product of New-York from these results obtained in New-Brunswick; for, when I discoursed on the relations of Geology to Agriculture, I demonstrated, from the character of the soil of the two countries, as shown by the Geological Map, that, generally speaking, the western portion of New-York was naturally more fertile than a large portion of New-Brunswick, and therefore I conclude that the average product of New-Brunswick is far below what was formerly the case in New-York.

It may be interesting to you to present to you the average product of Ohio. In the northern part of Ohio, after a cultivation of 20 years, the average returns are scarcely half what they were when first settled, showing that the soil there is in the course of gradual exhaustion. The averages for the year 1848, which I find in the Transactions of the Agricultural Society of that State, are as follows: Of wheat, 15 bushels per acre; barley, 24; oats, 33; rye, 16; Indian corn, 41.

You see, therefore, that in Ohio the condition of things is nearly the same, so far as wheat and oats are concerned, as in New-York; barley and rye are greater, and corn much greater—many parts of that State being peculiarly favorable to the growth of Indian corn.

I have also here the average products of all the States; but I see I have not put down the general average for the whole. It is enough, however, for our purpose to say, that the average product of this State

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is about the average of Ohio, and that both States are sailing in the same boat; and that if you go on here in the same process of exhaustion, you will soon compete with that State.

Compare, for a moment, with these statistics, the crops in England. The average product there is, of wheat, 21 bushels. It is proper, however, to say here, that we have no statistics, and that this is altogether guess work. Our censuses give us no statistics of agricultural products; our farmers, also, are very jealous about giving information on these points; they have rents to pay, and they naturally think that if they give in large returns, they will have to pay larger rents; and that is one reason why we never have this data. Hence, the results I give you are but approximations. From the best information, the results are these: of wheat, 21 bushels per acre; oats, 35; barley, 32. That is all I can give you of the product of England. The averages of Scotland are these: wheat, 30 bushels per acre; oats, 46; barley, 40. These results are on the best quality of land.

I believe there is no reason to doubt that what has been produced in England and Scotland might be produced in New-York. I infer this, not only from comparing the character of both countries, but from the fact that the prize crops, annually competed for in your State, are larger than those given as the averages in England and Scotland. I have a table of the amount of premium crops in '46, and they range thus: wheat, 56 bushels an acre—that is the highest; Indian corn, 142 bushels—the average is only 25; oats, 106 bushels. This is all I have of the premium crops. Now, these are maximum results. I may state that in England we have crops of wheat as high as 88 bushels; of barley, 80 bushels; and of oats, 108. Indian corn we do not grow.

I regard this as certain, that if the climate and local circumstances are the same, what one soil will produce, science may enable another soil to produce; and that it is reasonable that the farmer who exercises a proper degree of skill in the culture of the soil, has a right to anticipate the same degree of success as has attended like efforts in other countries, having similar advantages of soil and climate. If certain parts of your country, which have a given geological character, will produce these large premium crops which I have mentioned, it is fair to presume that other parts of the State, having the same advantages of soil and climate, should produce the same results. This is the point which all interested in Agriculture hope for and desire, and wish you to aid them in attaining.

One point of view I might have pressed on you in regard to our Agriculture in Great Britain, and that is, that our farmers fancy they

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suffer from the competition of the grain-growing districts of this country; they believe you can produce corn cheaper than they can; whether you can produce more from the same quantity of land, is another question. I do not think you can, but you are likely to be seriously affected by the competition of the Western States. You are therefore in a condition similar to, or approaching that of England, and you will have to compete with the rich virgin lands, though already somewhat exhausted, and you must do something to compete successfully.

In what way are you to compete successfully with those new and fertile regions? You can only do it by raising larger crops from the same quantity of land, without more labor, and of course at less cost. In the introduction of improved agricultural implements, which in England is a matter of very great interest, you have perhaps an advantage over the more remote States. But your object should be, to grow a larger quantity of grain on the same surface and at a less relative cost than before. In this way, we, in England hope to compete with New-York and the richest of the western prairies.

How is this to be done? Nothing can be done in this direction unless effort is stimulated by necessity. Hence, because the necessity with us at home, is great, we shall do something; and so here, as the necessity becomes greater, you will make more effort to compete with those districts, and when you do this, and not till then, will you be successful. How is this to be done? Those who possess the most knowledge will be sure to distance those who compete with them, if that knowledge be combined with prudence and discretion, for it is often thrown in the teeth of the scientific farmer, that those who have gone before him, have all failed. But the truth is, that those cases pointed at as illustrations of the unsuccessful results of scientific farming, have been generally those of mere enthusiasts, who had little practical knowledge, and who, along with science, did not apply that common sense with which prudent men always conduct their affairs. Knowledge must be applied to the improvement of the soil, if we hope to succeed. I think I have shown during these lectures, that we do possess the knowledge which is capable of growing larger crops at a cheaper rate. Now, if we possess this knowledge, it must be diffused to be applied; no matter what knowledge there may be in books, or in the heads of a few men, unless it be diffused among men who can apply that knowledge among the farmers, it is comparatively useless.

There are many ways of diffusing knowledge, and among these is the establishment of agricultural societies. The establishment of agricultural libraries, is another means of diffusing knowledge among far-

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mers. Though in our country farmers are not generally reading men, still there always a few men in agricultural communities, everywhere, who do read, and are anxious to improve themselves in this branch of knowledge, and it is desirable in this view, that libraries containing agricultural works should be established. Their ideas and their knowledge, like a pillar of fire, become, as it were, centers, from which light radiates all around. Among us, there are organised farmers' clubs, in subordination to agricultural societies, where agricultural topics are discussed. We have also lectures occasionally, given sometimes in stated places, which are well attended, and by which knowledge is diffused. In the matter of agricultural periodicals, I do not think we have anything better than yours. Some of those published in this country are exceedingly good, and are well known in Europe. These are important instruments in the diffusion of sound knowledge on this subject. But I pass over all this, and come to the only other mode of diffusing this knowledge, and that is, by means of agricultural schools.

It is extraordinary, how little has been done for the diffusion of agricultural knowledge in this way—how long a time has elapsed in every country, before it has been found necessary to establish schools for this purpose. It is also remarkable what applause has been bestowed on those countries which first introduced this system, and who did the little that was done, during the last century, in that direction. What was done in Switzerland and Prussia, made a great noise at the time; but they did little after all. It is also remarkable that in those countries in Europe which have made the highest advancement in national education, how slowly they avail themselves of the means of instruction in this branch of knowledge. I hope and believe that the absence of those old habits and prejudices which so much restrain and retard the progress of such knowledge in Europe, will not retard its diffusion, among the more enlightened population of the New World.

But there are causes at work in the old world, which under all the efforts to diffuse agricultural knowledge, have retarded its diffusion by such means. We have schools for agricultural instruction, in all its grades; yet we find that in the neighborhood of these schools, not only is knowledge not diffused among the peasantry, but both they and the lands they cultivate, are in the most miserable condition possible. In my address at Syracuse, I alluded to some results in France and Bavaria, where in the latter particularly they have agricultural schools, model farms, agricultural societies, and agricultural instruction in the common schools, yet the Agriculture of Bavaria is of a grade among the lowest in all Germany. So in France where Agriculture is in a bad condition, there is an agricultural University, and there are central

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agricultural schools in all the provinces. Instruction is also given to the peasantry in the communes. Therefore, though instruction in this branch of art is slow in being introduced, we are not to infer from the existence of schools in any country that Agriculture is in a flourishing condition there, nor are we to infer the contrary from the absence of these schools. In Scotland there does not exist a single agricultural school, yet its Agriculture is in a high state. In England, where ten years ago there were no such schools, Agriculture ranks next to that of Scotland. These instances, and those I have cited in France and Bavaria, show that the fact, that these schools exist in any country, affords no information as to the state of its Agriculture.

Hence in giving instruction in schools on agricultural subjects, experience in all countries that I have any knowledge of, shows that there are certain things to be attended to. First, it is necessary to avoid as far as possible the inculcation of organic changes in existing methods and institutions, you know how difficult it is to introduce anything new at all into our schools or seminaries. If you go for a great deal, you get nothing, if you ask only for a small portion of time, or give a little additional labor to the school master, requiring no new machinery to carry it out, then you are more likely to succeed, than if you at once demand, as some have, a large portion of the time, both of the pupil and the master in imparting new instruction. I do not know how far this caution may be necessary in this country, but as prudent men you would naturally adopt that course; as you would find that the introduction of such instruction would be more generally acceded to if you ask only what is necessary, and do not hurry on in advance of public sentiment.

To give you an idea of the manner in which this thing has been managed with us, I will state what provision has been made for agricultural instruction in Great Britain and Ireland. There are not many Agricultural schools in England, but there are a good many in Ireland. We have no special Agricultural schools in Scotland. In England and Ireland the principles of Agriculture were first introduced into the elementary schools. I say the principles, for you cannot expect to find a schoolmaster who can instruct his pupils in practical Agriculture. In general his education does not fit him for it, and it is therefore better in the elementary schools to undertake nothing beyond instruction in the principles of Agriculture. By principles, I mean those results to which scientific investigation has arrived; for instance, if I say that all substances which contain nitrogen in a certain state, are more or less useful to vegetation, that is a principle—a fact, which is the result of

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experiment and research; that is one principle. If, again, I say that all substances contain phosphate of lime, which forms a great part of the bones of animals, is capable of being useful to the growth of crops, I announce another principle, which is the result of a great many investigations. Thus I can state principles of this kind, which a boy can readily learn. It is such principles as these, that it is desirable to give in elementary schools, and when presented in brief terms, is never forgotten, and the boy when he goes out upon the farm recollects it; he casts about for these substances, and if they are applied to the soil, he knows what the results will be; for this is a procedure which is regulated altogether by a knowledge of principles. To fit the school master for teaching Agricultural principles, the study has been introduced into our normal schools in England, Scotland and Ireland, as a regular branch of instruction, and the school master now goes out able to give instruction, which will qualify the boy to become master of the principles in a short time.

So there are established in England in some of the grammar schools, and in some private academies, under the direction of individuals, agricultural departments, where instruction is given in the different branches of natural science bearing on Agriculture, and some knowledge also of practice obtained, not by a farm attached to the institution, but from the farms in the neighborhood. Within the last two years I established a school at Camelford, converting a grammar school into it. The farmers of the district, all around, open their farms to the inspection of the pupils, who availed themselves of the opportunity to view these farms at stated times, and observed all the processes going on, particularly in the labor also, and thus were enabled to get a practical knowledge of the subject, which very much facilitated the efforts of the master to explain the theory of what they saw going on around them.

We have also special agricultural schools in different parts of Ireland; there they were established before they were in Great Brittain. You know from the condition of Ireland, how desirable there a diffusion of such knowledge must be among the agricultural classes, and how important it must be to teach them how small farms may be made to yield great returns. These agricultural schools have been found to be productive of great benefits. The school of Temple Moyle has a large number of pupils, who are made to till the farm attached to it, thus applying practically the knowledge obtained in the school, and the result has been that the whole expense of maintaining the pupils, amounted to but eleven pounds a year each, or about fifty dollars, the farm pay-

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ing all the rest of the expense of maintaing the institution, with the addition of some subscriptions raised in the locality. Now we have special agricultural schools established by a national board of education—they have introduced into them the little catechism of which I have before spoken, in which the principles of Agriculture are stated in a brief and clear manner. It is found that the boys never forget them, and are never at a loss how to apply them. They have also established district agricultural schools, and have made provision to fit teachers for them. A model farm has been attached to the normal school near. These are all schools established under the government in Ireland. We have no such schools in Great Britain established by the national board of education, but there too the study has been introduced in the common schools. But we have in England an agricultural college established within a few years. Six or eight years ago a school was projected at Cirencester, it had great difficulties to contend with at the outset, and one great difficulty was the apathy and indifference of the farmers themselves. Instruction was cheap there, but the farmers did not avail themselves of it. During the first years of its existence, out of forty pupils only eight were sons of farmers. But that state of things is fast disappearing, and a desire for this kind of knowledge has grown stronger. It has now about one hundred pupils, and the institution continues to flourish more and more every year.

Having given you this account of what we are doing in England and Ireland, you see that we have done little as yet, and that we have experienced little or no benefit from agricultural education; but we have come to a state, when we must, from necessity get this education, in order to compete with you.

You propose to do certain things here in New-York, and here allow me to make one or two remarks. It has been proposed to establish an Agricultural College. As to this I have no doubt whatever, that it is a proper measure to take; as it is proper in England, so it is in New-York. This should be done so soon as you are able to accomplish it—it is a right thing to aim at. The difficulty does not lie in establishing the institution, but in the details; you should be cautious that in the details you adopt no rash or hasty measures, but act with discretion and judgment. Your efforts should not be divided; you should set out with the determination to establish the college and nothing else—I mean nothing else in the way of establishing colleges. I have been asked whether I thought it would not be better to have six small colleges in different parts of the State. I had not studied the circumstances of the State, sufficiently to give advice on that point, but whatever these cir-

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cumstances may be, or whatever the intention hereafter, you should not propose at the start to do more than establish *one college*, and direct all your efforts to get that in good working condition before you attempt another. If you fail in one you certainly would in twenty, if you succeed in one, you can then go on and establish more. It is of great consequence in reference to the character of the State and of the teachers, that you should have one good school first. If you were to establish thirty colleges in different counties of the State, I should like to know where you would get teachers to fill them? I do not think you will find in all America sound men of knowledge and discretion, who could be safely trusted to teach scientific Agriculture in thirty schools. I do not think they exist in the Union, much less in the State of New-York. You will act wisely and discreetly if you try to get one institution, it will be useful to your State, and will turn out men to fill up any other schools which you may afterwards establish.

Again, in any building which may be erected for this purpose, there should be provision only for what is likely to be wanted, instead of laying out money in erecting buildings to accommodate a large number of pupils, who have not come yet; you should begin by making room enough only for those who first come, and then you can add accommodations, as they are found to be necessary. One point I desire to impress upon you—excuse the liberty I take: you should not encourage the idea that any great and surprising results will spring out of this all at once. I have been myself the victim of extraordinary expectations. I have been attached to an institution in which persons were interested who had these high-wrought expectations of what was to result from it, and who almost supposed that one result would be, that gold would rise up, as it were, in the pockets of the farmers. These results not being realized, many concluded that science was really of no use in agricultural operations. If after the lapse of years you can, through this college, increase the average product of the State—if you can raise the average of wheat, alone, from fourteen to fifteen bushels per acre—I ask if this one additional bushel only, taking the State through, would not pay the cost of the college for ten years? If you can raise oats, from twenty-six to thirty-four bushels per acre, you will have accomplished a great result. But if you expect extraordinary results in a few years, either on the general agricultural character of the State or its farming population, you will be disappointed—not on account of the fault of the teacher, or of the system, but because your expectations were too high. As I have said, I have myself been the victim of such expectations; and I warn you not to stumble over the same stone. If,

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after the lapse of years, you can raise the character of the agricultural community, so that a stranger, visiting your farms, finds the younger men possessed of greater intelligence than their fathers, and applying that knowledge intelligently in practice, so that the superior skill and science of the farmers of New-York are obvious, that will indeed be a proud thing for you to see, and for a foreigner to discover and acknowledge. But so great a result cannot be brought about in one year—it may take ten years. Again: it has been proposed to give instruction in scientific Agriculture, in the medical colleges of the State. All instruction in this branch of knowledge should be encouraged; no attempt should be made to put down such measures, if any are on foot. Medical men, passing from the college into a rural district, to practice their profession, cannot be less useful for having a knowledge of scientific Agriculture. Therefore, in medical schools, encouragement should be given to efforts to introduce this branch of study there. So in theological schools, the study should be encouraged. Clergymen may exercise a salutary influence upon husbandry, as upon good morals; but the great difficulty is, that the farmers will not send their sons to these colleges, and hence the rural schools are best adapted to the diffusion, (in the right quarter, and directly,) of agricultural knowledge. Besides, if they were to go to these colleges, they would be apt to learn unsound doctrine. It is not to be expected that men, however profound in one department of science, and whose habits of thought and study are all in that direction, should be familiar with practical Agriculture. Hence, they may take up crude notions and inculcate them, and do harm, rather than good, to the pupils under them.

It has also been proposed to attach agricultural departments to some of the colleges. To that there can be no objection; at the same time, any encouragement which the State may give to this kind of instruction, should be given to the one school by which all other schools will be regulated, when once you get it fairly organized. There is this difficulty in regard to attaching agricultural departments to existing colleges, that if this new department is under mere scientific men, the proper wants of farmers' sons will not be properly looked to. So sensible am I of this, that in the suggestions I made to the Legislature at New-Brunswick, as to the mode of improving its Agriculture, whilst I recommended an agricultural school at Fredericktown, where there is a college, I have recommended that it should not be connected with the college, because they are not practical men, and are not calculated to give instruction to pupils intended for practical life. What is true there, is true all over the world. It is necessary that such a school

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should be in charge of men who understand Agriculture, and the wants and wishes of agriculturists, and who know what should be done to improve both.

I believe many persons look forward to the introduction of agricultural instruction into common schools, and I think it very important that this should not be lost sight of. In the lower grade of schools I think it most important, and it should commend itself to those having the affairs of the State in charge. The mass of your countrymen get their instruction in these schools. You reach a greater number by introducing this study into these schools, and you reach them at the least possible expense of money and time. You only ask the school master to give a little time to teaching one certain book, selected for its bearing on the principles only of Agriculture. To facilitate this instruction, I drew up this little catechism. It has been introduced extensively into the schools in Great Britain, and translated into every European language. But this obstacle has been found to exist, not only at home, but in other countries, and that is, the want of qualification or inclination on the part of the schoolmaster, to teach. In Scotland our schoolmasters are well educated men, but they are fixed and stationary, pursuing their vocations at one place generally all their lives, unless, as is rarely the case, some of the more skilful ones are transferred to places of greater emolument. These men find no difficulty in introducing this catechism. It has also been introduced into the schools in England, but there the grade of schoolmasters is lower. But we have there national schools for the education of teachers, the effect of which is, that a race of men are now coming out, who are capable of teaching this branch of knowledge. The same difficulty exists in Belgium and France, where their schoolmasters are not sufficiently instructed themselves to teach it. Of course this obstacle is only to be overcome by additional instruction to the schoolmasters, and it is a reproach to them, that they have so little application or capacity, that they cannot learn a catechism which a boy seven years old can perfectly understand. I examined a class of about a dozen boys, the eldest of whom was fourteen, the youngest seven years of age; the eldest got the first prize, the youngest the second. It cannot, therefore, be difficult for a schoolmaster to learn to teach these simple principles.

There is one obstacle, which in this State appears to me to be one of some difficulty—an obstacle to the introduction of this kind of study into the schools, and that arises from the unsettled condition of your teachers. You have not schoolmasters who permanently remain in one district; the trustees engage a teacher for a limited time, and then both

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parties are at liberty to quit the engagement. In England they are fixed residents in the parish to which they belong. The difficulty here, is therefore, one of some moment. It precludes a unity of system, a concentration of effort in carrying it out, and it prevents the schoolmaster from taking that pride in the progress of his pupils, which he would have if he knew that a school was to be under his care for years, and he responsible for its management. This may stand in your way in introducing this study into your common schools, but it is not insurmountable, and you would do well to inquire how far it is practical to surmount it.

One or two observations as to the kind of instruction which should go into the schools, with a prospect of agricultural improvement. I have told you what branches of science tell on agricultural operations, and bring out principles applicable to the growing of crops, that the boy can learn in elementary schools; but in learning them, it is necessary to use scientific terms. Nitrogen, for instance, might puzzle a farmer; the boy, therefore, must understand this; he must be shown what it is. So with phosphate of lime; its nature must be explained to him, and after that, the boy will always attach the right signification to the word, understand your principles, and apply them intelligently. These two words belong to the chemical nomenclature; but in teaching these principles of which I have spoken, you do not teach Chemistry. If I tell the boy that rocks form the different soils, that is not teaching geology, but Agriculture. As to Chemistry, I do not object to its introduction into schools. I have devoted my life to the study of Chemistry, and it may well be supposed that I should not be averse to it. I am not. So with Geology; it is a study in which I feel a deep interest, but I do not recommend either on behalf of Agriculture. I recommend agricultural instruction, and Chemistry and Geology are only necessary to explain the terms used, in the elucidation of agricultural principles. At the same time, I have felt the difficulty of selecting what is necessary to teach, and what should be excluded from the list of studies. The chemist and the geologist teach their peculiar sciences. If they know at the same time the principles of practical Agriculture, then they know what it is necessary to teach, and what not. If you tell a boy any more than is necessary to enable him, for instance, to distinguish nitrogen from every thing else, you only confuse him. In this little book, the catechism to which I have referred, there are about twenty chemical words, which it is necesssary to explain, and to do this, you must show the pupil what the substances are which these terms represent. Then he can follow you, and then he can understand all that is written in this book and the larger works. It is

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only to this extent, that Chemistry and other sciences ought to be introduced into your common schools to teach Agriculture. I do not object to the introduction of Geology, Botany or Chemistry, but on behalf of Agriculture, I do ask for it. I only ask, and have asked everywhere, one hour a week during the last year of a boy's tuition, to impress upon his mind fully all the elementary principles of practical Agriculture; so that little is required to be taught in the elementary schools, and this little will produce good directly on the boy himself, and indirectly on the boy's father. It is remarkable how a man, who is most obstinate in resisting any new idea or process in regard to Agriculture when suggested by a grown up man, I say it is very remarkable, how readily he will listen to the same thing, coming from the mouth of his own son. The boy tells what he learns in the school to his father. The father is delighted at the wisdom of his own son, and he will allow his son to adopt in practice on his farm, what he will not listen to a moment, if suggested by a stranger and an adult. What is suggested by his son goes through his heart to his head, and that is the way to many people's heads.

My time is so far exhausted, that I cannot detain you with any further details. I will only make one other observation, and that is, that it is of great consequcnce that a farmer who owns a farm now, should make himself familiar with the best methods of improving the soil, in order to retain his position, for if he does not, another who has more skill, will drive him from his position, and take his place. As the son generally thinks as the father does, there is no appeal stronger to such men as are most unwilling to adopt new methods themselves, than that to a father on behalf of his child and his future prospects. This is true, as a general rule. I know that you have a strong desire that your sons should thrive in their professions, as parents generally have, that their sons should excel in their professions. This you can only do, by giving them more knowledge than you have; as much, at least, as the sons of others, bringing up their sons to different pursuits. I can make no stronger appeal to you, to exert yourselves, to take the proper steps to secure that knowledge, if not for yourselves, at least for those who are to follow you in the same profession. I cannot but think that you will say with the old man, who in a remote part of Scotland, attended one of my lectures, and drank in, open mouthed, all that I said, and who after I had concluded, came to me with tears in his eyes, and told me he was too old to learn all that, but he would like well to have his son learn it. I hope you will all participate in that feeling and see to it, that your sons shall not be ignorant of what concerns so nearly their prospects in life.

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Professor JOHNSTON having concluded, Mr. PRENTICE, the President of the State Agricultural Society took the Chair, and Mr. B. P. JOHNSON was appointed Secretary.

Mr. BEEKMAN, of Columbia, remarked that Prof. JOHNSTON having now finished his course of lectures, it was due to him, as well as to the Society, that we should express an opinion as to the merits of these lectures, and to test the sense of the Society, he begged leave to offer a resolution, which he read, as follows:

Resolved, That we have listened with great interest, as well as profit, to the very instructive course of lectures delivered by Prof. JOHNSTON, on "The General Relations of Science to Practical Agriculture;" and that we take great pleasure in expressing our united approbation of the great practical value of his lectures to the practical farmer, as well as to the man of science.

Dr. BEEKMAN said he had another resolution in relation to the volume which Professor JOHNSTON had exhibited to us, being the second edition of his lectures on Agricultural Chemistry and Geology, presenting the results of scientific research adapted to practical Agriculture, which he begged leave to offer for the consideration of the Society. It was as follows:

Resolved, That as the principles advanced in the lectures which have been delivered, are more fully developed in the second edition of Prof. JOHNSTON's lectures on Agricultural Chemistry and Geology, we would respectfully request him, if consistent with his engagements, to prepare an edition for re-publication in this country.

Mr. Baldwin of Syracuse, said he rose to second the resolutions offered by the gentleman from Columbia; and in doing so, begged leave to submit a few remarks.

When we contemplate, said Mr. B., the elevated position which the learned Professor occupies in his own country, standing as he does at the head of a profession which he so much adorns; when we consider how extended, broad and profitable to himself as well as to others is the field of his labors—and how great have been the sacrifices pecuniary and otherwise, which he has made in accepting the invitation of our Society, to deliver its annual address last autumn, and in remaining here, and in this vicinity since that time, to deliver the course of lectures which have just now closed, and to which we have listened with so much profit and delight—and especially, when we reflect upon the *character* of those lectures—the beautiful manner in which they have opened to us the great volume of nature, giving us a glance at its hid-

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den mysteries and treasures—showing us the properties of the earth and the soils, the connection and relation between the earth and the vegetable kingdom, and the connection and relation between that kingdom and the animal creation, with the means of improving each; and, by the knowledge thus imparted, provoked an appetite for more, and leading us by that knowledge, from nature up to nature's God, and thereby making us not only better agriculturists, but better men, better citizens, and better christians; in view, sir, of these multiplied and high considerations, I am sure that I but express a common sentiment when I say that we sincerely thank our friend, the learned professor.

And, Mr. President, said Mr. B., if these lectures shall have as we trust in heaven they may, the effect of awakening our Legislators to a proper sense of their duty in regard to this great interest, and which shall lead them fairly and fully to respond to the recommendations of his Excellency the Governor in his late message—to respond to the recommendations of the Agricultural Commissioners in their late and able report on the subject of an Agricultural College and Experimental Farm—to respond fairly and fully to the united voice of their constituency, how deep and enduring will be that obligation and our gratitude.

And sir, said Mr. B., why should they not thus respond? Have not all the other great interests of the State found protection at their hands, while this, the parent of them all, has been lost sight of and neglected. Is there any other interest in the State greater than this? And why should this alone be left without protection?

By the lecture which has just now closed, you have learned that the farming interests in this State are in process of deterioration; that the average of all crops is continually diminishing; the tables of the products, exhibited by the learned Professor, show this; and he also shows us the means by which these products may be increased—by which we may be brought back to the products of a virgin soil.

The learned Professor in his lecture this evening has also referred us to the products of the fertile soils of our new States, the prairies of the boundless west, and which are brought into direct competition with the products of the soil of this State, and by which it appears most evident that we cannot much longer sustain ourselves against this powerful competition. What then, sir, is to be done? Why, sir, there is but one thing that *can* be done, and that is, to improve our system of Agriculture, and by that system to increase the quantity as well as the quality of our agricultural products. The lights of experience and of science will enable us to do this. But a knowledge of that experience

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and science must be acquired, and how can it be so well acquired as at an institution established for that purpose.

It is true that reference has been made by the learned professor to the agricultural schools of Bavaria, Prussia and other countries in Europe; but it occured to him at the time, as he doubted not it did to them, that as between the people of those countries and our own, there was no analogy whatever. Their governments were different. They were oppressed subjects; were vassals and serfs, while we were freemen; they were ignorant—we enlightened. There the masses are uneducated, while here education like the light and dews of heaven, under our common school system, descends as it should descend, alike and equally upon all. Our farmers as a class are intelligent and educated men. But few of the farmers of those countries own the soil they cultivate, while ours, not only own it in fee, but are emphatically the lords of the soil. Even in England, the learned professor has told us, that the farmers as a class were not reading men. How different the case with us. Ours *are* reading men. Where is the farmer in this State that does not at least take his newspaper? Look, sir, at the one hundred thousand subscribers and readers of various agricultural periodicals of the State, and it will be seen that there is not the slightest analogy between the old world and the new in this respect.

Sir, continued Mr. B., the farmers of New-York are not only ready for, but they demand this measure—the ground is already prepared—the loaf is already leavened; for eighteen years at least it has been at work, and what are its fruits? Look, sir, to the general interest awakened on this subject, look to the immense gatherings at your annual fairs, look to the improved condition of stock and agricultural implements; and above all, sir, to the increased circulation of agricultural papers and books, and you will agree with me, sir, that the time *has* come; that the harvest is ripe; and the sickles are ready and only wait the bidding of the law-making power, to commence the work. Yes, sir, the time *has* come when the farmers of New-York, in view of the almost overwhelming competition of the west, are called upon to look at home—to protect their own interests. And how, sir, I repeat, is that interest to be protected, except by the introduction into it of the lights of experience and science? We have this evening been taught by the learned Professor, how one acre can be multiplied into four acres; or, in other words, how one acre can, by an improved system of Agriculture, be made to yield as much as under our present system, four produce.

Now, sir, suppose a proposition were to be submitted to this Legislature, by which the agricultural wealth of the State, for an outlay of a

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few thousand dollars, could be doubled, does any one doubt that such proposition would at once be seized upon and adopted by that honorable body? Surely not; and yet for a comparatively small outlay, by adopting the system proposed, that wealth may not only be doubled, but quadrupled. And will not the Legislature adopt it; will they not give us an institution where the farmer's boy may be educated—where he may receive in reference to his calling, such an education as all other classes in this community receive in reference to theirs? In a word, will it longer allow this numerous and highly respectable class of our fellow citizens to be neglected; will the Legislature longer allow this great interest, which lies at the foundation of all others, to suffer for the want of that aid which it, and the united voice of an impatient constituency so loudly and imperiously demand? I trust not, sir. I trust, said Mr. B., that the Legislature will not only give us an Agricultural College and Experimental Farm, but that it will endow it with such ample funds, as to place it upon a strong and permanent basis, a basis which shall alike perpetuate throughout all time to come, the wisdom of this Legislature and the liberality of the State.

Mr. B. begged pardon for trespassing so long upon the attention of the house, but he could not have said less, either in reference to his friend, the learned Professor, or of the great and interesting subject now before the Legislature, without doing violence to his own feelings; and he therefore hoped that he might be excused for the time which he had occupied.

Mr. B. said he must also crave the indulgence of the house for a moment, while he considered the second resolution offered by the gentleman from Columbia. That resolution, sir, proposes to reprint in this country a valuable work of Professor Johnston on the subject of Agriculture and its kindred sciences. I have not, said Mr. B., read the whole of that work, but from the examination which I have given it, I am satisfied that it will make a valuable addition to our agricultural libraries; indeed, such is its character that I am of the opinion that any man who will make himself familiar with its contents, will become a scientific farmer. But the English edition was too expensive for general circulation; he hoped, therefore, that a cheap American edition might be issued, and that it might be found, as he had no doubt it would be, on the shelf of every intelligent farmer of the State. And, in conclusion, he desired that both resolutions might be adopted.

At the close of Mr. B's. remarks, the resolutions were unanimously adopted, and then the Society adjourned.

B. P. JOHNSON, *Secretary.*

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REPORTS OF COMMITTEES AT ANNUAL MEETING,

JANUARY, 1850.

ESSAYS AND EXPERIMENTS.

Committee.—John Delafield, Oaklands; J. P. Beekman, Kinderhook; George Geddes, Fairmount.

The attention of the committee, to which was referred essays, experiments and work on schools, has been led, in the course of their examinations, to contemplate the vast field of usefulness which from year to year is opening to view, under the influences of the State Agricultural Society. Upon the surface of this broad field, may be distinctly seen many of the well defined and fixed principles of Agriculture, traced out in lines to be easily and readily comprehended by the intelligent and inquiring man.

Within a few years, the cultivation of the earth has become a study; a science, claiming much observation, research and investigation, with as much application of mind as any other pursuit. For a time, the novelty of this study, its varied divisions and sub-divisions, embracing nearly every other art, and every science, confined it within the range of a few prominent facts, whose cause and effect were understood by a less number of men. Happily, this study is now advancing with rapid strides, and these facts are multiplying, dissipating early difficulties, breaking down, and crushing in their progress the most obstinate of old prejudices.

Since the organization of the State Society, eight volumes of its Transactions have been published, and each volume contains essays or papers, on one or more subjects connected with Agriculture, carrying practical and important information to the farmer, not to be had elsewhere. Few, perhaps, are aware of the number, extent and value of these papers; nor was the committee prepared to find so large a collection as appears upon reference to the Society's Transactions. An alphabetical catalogue or list is appended to this report, stating the

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subjects treated of, the author, and the volume by date, in which they are respectively embodied. Though so much has been accomplished, we believe the field is now but fairly opened, and kindly courts the exercise of investigation, experiment and sound argument, from the observing farmer, and from men devoted to science connected with Agriculture.

The decided benefits which have been derived from recent investigations of the nature, organization, and food of plants, and in connection therewith the production and application of suitable manures, or fertilizing matters, must be apparent to all who have consulted the Transactions of the State Agricultural Society. While we admit the fertility of the inventive genius of our citizens, we have reason to regret the many obstacles remaining in the path of the farmer, preventing, in a degree, the most effective power of mechanism, to aid in his toil and labor. The science of force and motion (mechanics) is necessary and important to the perfection of the farmer's work. Some knowledge of practical mechanics is essential to a right understanding of the tools needful for his use, their proper construction and strength. The force of fluids, as well as solids, is important to him in draining, irrigation, in protecting his soil from injury by streams. The common occupation of loading his wagon, and other farm operations, often give evidence of the need of knowledge, in relation to the laws of gravity.

With these impressions, the committee suggests the propriety of offering a premium for the best essay on mechanics, or the science of force and motion (solids and fluids) to be divested, as far as practicable, of technicalities, and illustrating the importance of this branch of science in prosecuting succcssfully the ordinary pursuits of Agriculture.

J. DELAFIELD, *Chairman.*

LIST OF ARTICLES PUBLISHED.

Agricultural schools,	A. S. Wynkoop,	1842
do	education, John Greig,	1844
do	schools, Rev. S. Luckey,	1847
do	societies, advantages, D. A. Ogden,	1847
do	societies of Vermont, C. Goodrich,	1848
do	survey of Washington Co., Asa Fitch,	1848
do	Institute, John Wilkinson,	1848
Agriculture of	South Carolina, Hon. J. R. Poinsett,	1841
do	South Carolina, Hon. J. R. Poinsett,	1844
Agriculture of	Pensylvania, W. Penn Kinzer,	1841
do	Virginia, James M. Garnett,	1841

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Agriculture of England, John Hannam,..... 1841
do Indiana, Solon Robinson, ... 1842
do Indiana, F. A. Howard, ... 1844
do Maryland, G. B. Smith,..... 1842
do Mississippi, M. W. Phillips,..... 1844
do Malta, W. Winthrop Andrews, ... 1844
do Winebago, Illinois, Anson S. Miller,..... 1844
do Addison Co., Vermont, Solomon W. Jewett,.. 1844
do East Windsor, Conn., Henry Watson,..... 1844
do Vermont, Chauncey Goodrich, ... 1847
do Its principles, Fredk. A. Ford, S. Carolina, .. 1847
do reports on, Dr. D. Lee, ... 1844
Analysis of soils, Willis Gaylord, ... 1844
do Indian corn, J. H. Salisbury, ... 1848
Angola grass, P. Lund Simmonds, London,..... 1846
Bees, care of &c., J. M. Weeks, Vermont, ... 1842
Bones as manure, Jas. F. W. Johnston, Durham,..... 1847
Cattle, H. S. Randall, ... 1841
do their best breeds, &c., Heman Chapin, ... 1841
do with sheep and root culture, D. S. Curtis, ... 1841
do best breeds and crossing, J. H. Hepburn, Penn., ... 1842
do native and crossing, H. S. Randall,..... 1842
do Ayrshire, George Randall, ... 1842
do improved breeds &c., B. P. Johnson,..... 1843
do Scottish Highland, Sanford Howard, ... 1843
do soiling, R. L. Pell,..... 1844
do English, their breeds &c., George Drake, Eng.,..... 1844
do Galloway, Sanford Howard, ... 1846
do Red sea, Z. Pratt, ... 1848
Canada thistles, essay on, A. Stevens,..... 1846
do do do Sereno E. Todd,..... 1846
Charcoal as a manure, J. H. Hepburn, Penn.,..... 1841
Cheese dairies, account of, B. P. Johnson, ... 1847
Corn stalk sugar, making, M. Adams, ... 1843
do its cultivation &c., Geo. Geddes and others,..... 1844
do experiments on, W. D. Osborne,..... 1847
Cranberry, its cultivation, Sullivan Bates, ... 1844
Currant moth, its habits &c., Asa Fitch,..... 1847
Designs, Farm house &c., John J. Thomas,..... 1842
do Farm buildings &c., D. G. Mitchell, Conn.,..... 1842

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Designs, Farm buildings, T. M. Niven, ... 1842
do Farm cottage, Mrs. S. Howard, ... 1847
do a Piggery, S. W. Jewett, ... 1847
do Farm dwellings, F. R. Elliott, Ohio, ... 1848
Draining, Holkam, ... 1842
do remarks on, J. P. Beekman, ... 1847
do experiments on A. D. Spoor, ... 1847
do thorough, E. J. Woolsey, ... 1847
do remarks on, J. Delafield, ... 1848
Dairies, experiments in the management of cheese dairies, Alonzo L. Fish, ... 1847
Dairies, cheese and butter, B. P. Johnson, ... 1847-8
Education and Agriculture, Alex. Walsh, ... 1842
Experiments on Indian corn,
oats, W. D. Osborne, ... 1847
wheat, do 1848
Farm management, Willis Gaylord, ... 1842
Farms, size of, weeds, capital, Henry H. Hopkins, ... 1842
Farm-house, hints, A. J. Downing, ... 1845
Farm management, J. J. Thomas, ... 1844
Fences, H. S. Morse, ... 1841
Fruit garden, David Thomas, ... 1841
Fruits, hints on describing, John J. Thomas, ... 1842
Fruit of Onieda county, Agricola, ... 1847
Fruits and fruit culture, F. R. Elliott, ... 1848
Grape and strawberry culture, N. Longworth, ... 1848
Grape, its culture, &c., L. B. Langworthy, ... 1841
Grape culture, H. Longworth, Cinc, ... 1846
Geology and Agriculture, Willis Gaylord, ... 1841
Geology, advantages of, Algernon S. Roberts, Phila, ... 1848
Geological Survey of New-York, Professor James Hall, ... 1843
Gypsum, and red clover, Wm. Penn Kinzer, ... 1844
Grain mill, iron, A. B. Allen, ... 1847
Grain weevil, account of, J. E. Gavit, ... 1848
Hemp, its culture, James Sawyer, ... 1841
Horses, winter keep, Ezra Meech, Vermont, ... 1841
do their best breeds, Wm. B. Ludlow, ... 1841
Hedges, of thorn, &c., M. B. Bateham, ... 1844
Hessian fly, history, character, &c., Asa Fitch, M. D., ... 1846
Insects injurious to field and other crops, Willis Gaylord, ... 1843

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Insects and diseases of the wheat crop, John J. Thomas,.... 1843
Irrigation, essay on, ... 1845
Leather, its value and extent, Charles Leupp,..... 1846
Lime, and its uses, R. L. Pell 1846
do and marl, uses of, James Hyatt, ... 1848
Manufacturing and wool growing interest, Samuel Lawrence, Lowell,..... 1841
Madder, its cultivation, M. B. Bateham, ... 1843
Manures, preparation, &c., Willis Gaylord,..... 1842
do their waste, L. B. Langworthy, ... 1844
do special, doctrine of, D. P. Gardner, ... 1846
Massachusetts Ag. Society, origin and progress, John Welles,. 1844
Meteorology, J. H. Salisbury, ... 1848
Mulberry, its cultivation, D. Stebbins,..... 1841
Orchard, its culture and uses of the apple, J. J. Thomas,.... 1844
Oxen, their use &c., J. S. Skinner, ... 1844
Pigeon weed, essay on, Charles M. Stark, ... 1846
Poultry, essay on, C. N. Bement,..... 1841
Potato rot, essay on, Andrew Bush, Pa.,..... 1845
do in Scotland, J. P. Norton,..... 1845
do essay, C. E. Goodrich, Utica,..... 1847
do results of culture, C. E. Goodrich,..... 1848
do the sweet, S. S. Riddle,*..... ... 1848
Provision trade, T. C. Peters, ... 1844
Plank roads, construction of, &c., Geo. Geddes, ... 1846
Plow, improvement of, A. B. Allen,..... 1846
Rotation of crops, J. J. Thomas, ... 1844
Rotation, versus summer fallowing, Willis Gaylord, ... 1844
Science and Agriculture, J. J. Thomas,..... 1845
Sheep, their breeds, H. S. Randall, ... 1841
do Merino and Saxon, Wm. Jarvis, Vermont,..... 1841
do Merino and Saxon, H. D. Grove,..... 1841
do Paular Merino, S. W. Jewett,..... 1841
do management of, L. A. Morrell, ... 1841
do breeding, S. W. Jewett,..... 1842
do most profitable, Wightman Chapman, ... 1842
do Saxony and Merino, W. Chapman,..... 1844
do management of Merino, J. L. Randall, ... 1846
do management of fine wooled, D. S. Curtis,..... 1848
do do fine wooled, J. L. Randall,..... 1848
Silk, culture and manufacture, H. P. Byram, Kentucky,..... 1845

*Ridder, in vol. 1848 was a mis-print. B. P. J.

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Silk, culture, Gideon B. Smith, Maryland, ... 1841
Silk, culture, &c., D. Stebbins, ... 1847
Soils and their management, David Thomas, ... 1842
Stock, food for, E. N. Hosford, ... 1844
Swine, breeds and raising, B. P. Johnson, ... 1841
do feeding experiments, J. Murray Bacon, N. Jersey, ... 1847
Sub-soiling, C. N. Bement 1842
Sub-soil culture, John McDonald, ... 1844
Sub-soil plowing, S. McLean, ... 1845
do do J. Mallory, ... 1847
Statistics of New-York, S. S. Randall, ... 1845
Soiling, R. L. Pell, ... 1846
do H. A. Field, ... 1846
Tillage, essay, Willis Gaylord, ... 1841
do philosophy of, Dr. D. Lee, ... 1848
Tomato, egg plant, &c., account of, J. H. Salisbury, ... 1848
Trees and shrubs for cities and towns, D. J. Browne, ... 1846
Water used for irrigation at Glenythan, Scotland, James F. W. Johnston, ... 1847
Wheat, Italian, culture, &c., Jay Hathaway, ... 1841
do varieties of, Rawson Harmon, jr., ... 1842
do winter killing, Thomas Mellen, ... 1842
do experiments on varieties, Rawson Harmon, jr., ... 1843
do profitable cultivation of, Dr. D. Lee, and others, ... 1844
do preparation of light soils for, Elias Cost, ... 1846
do experiments on, W. D. Osborne, ... 1847
do in England, J. Slocum, ... 1848
Wheat fly, account of, Asa Fitch, ... 1845
Wool trade, letters on, J. B. Nott, ... 1846
Wright, Silas, biography of, committee of the society, ... 1847

DRAINING.

The committee has received a communication from Mr. Daniel Gates, of Madison county, with a statement of his method of constructing drains.

It does not appear that any new feature has been introduced or applied by Mr. Gates; but he bears witness to the benefits derived from drains wherever water is retained in the soil, causing the production of a grass of little value for pasture or meadow.

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Mr. Gates has not yet adopted the improved system of draining by tiles and pipes; his drains are constructed with stone from his fields; and even with these comparatively imperfect and more costly drains, he states that the drained portions of his farm yield better crops than other undrained portions.

The committee believe that Mr. Gates will be amply repaid, by the improved condition of his farm, for any extension of drainage that his moist or retentive soil may seem to require.

The committee recommend that a volume of the Transactions of the Society be presented to Mr. Gates for his communication.

RECLAIMING WET LANDS.

By Daniel Gates, Sullivan, Madison county.

The situation of my lands that I have drained was formerly springy and cold, and so moist most of the year that it could not be plowed, except after a long season of dry weather. The grass which grew upon it was poor and of very little use either for pasture or meadow.

I have drained on different kinds of soil, and in all cases with good success. In some instances, at the bottom of the ditches was marl, others gravel, and some clay, and the surface an intermixture, from the slate ridges in some instances.

I have tried both open and covered drains, but have been most successful with the covered drains. I commence by plowing deep in the dryest part of the year, generally in the latter part of August. I can ascertain where the springy places are, and can better decide how to arrange my ditches. I place the ditches so as to touch all the portions of the soil that are most moist, in order to drain it as complete as practicable. (Mr. Gates makes his ditches of loose stones on his farm, and covers with flat stone, or slabs, when stones are not to be had. His ditches generally from 18 to 20 inches deep, and about 15 inches wide. He has ditches covered with slabs which have been made eleven years, and are still in good preservation.)

As to the expense, it is but a trifle more than to finish properly a good open ditch with sloping sides. The objections to these latter ditches are, that they so readily fill up, and occasion much waste of land. The results of ditching have, I think, increased my land at least three times its former value. I have raised on this land so reclaimed, the season after the ditching was completed, the largest crops on my farm, of corn, potatoes, barley, and spring wheat. Some of it is now in meadow, which yields the first quality of timothy grass, where, previous to its being drained, it was scarcely worth mowing and gathering, and the quality very inferior.

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ESSAY ON INDIAN CORN.

The dependant condition of man on labor for every comfort, and his restless desire to bring all living things under subjection to his will and advantage, has ever been a stimulus, urging him to comprehend the structure and uses of animal and vegetable substances. In the endless variations of the vegetable world, he soon found order and system, and he was enabled to arrange the seeming millions of vegetable productions into genera, groups or species. While his researches were confined, this system was all sufficient, but when intercourse with distant climes introduced to his notice the rich products of the new world, this our hemisphere of "boundless luxuriance," language failed him for a true description, and the study of Botany had not so far advanced as to offer *certain* rules and *certain* principles upon which to erect a descriptive system, intelligible to all inquirers. Hence we may probably learn the difficulty of tracing the origin of plants, a difficulty continued to a late period, even to our own day, by the general application of the same name, by different nations to different plants. This may be illustrated by the fact, that in England the cereal grains are known by the general name of *corn*, while in this country we apply the name or term corn, to *maize*, only.

With such impressions, we have read the "Essay on the History and value of Indian Corn, as an agricultural product," by Mr. Charles Louis Flint, of West Roxbury, Massachusetts. It is but a few months since, that the State Agricultural Society has published a prize essay on Indian corn, the production of Mr. J. H. Salisbury; an essay embracing not only its general history, but presenting as we believe, the most minute and extensive chemical investigation of the plant and its several parts ever yet made.* There are of course points of resemblance in the his-

*Analysis of Indian corn at two different stages, by J. H. Salisbury, see p. 740, Trans., 1848. Oct. 5.—The corneous portion of the kernels is quite firm, or glazed, as it is called. The amylaceous part around the chit is yet soft and milky. At this stage, the kernels burn to a white ash, much more readily than when ripe.

TABLE 20.

Carbonic acid,	Trace.
Silicic acid,	0.900
Phosphoric acid, with a little per oxide of iron,	41.830
Lime,	0.075
Magnesia,	12.420
Potash,	28.405
Soda,	11.840
Sodium,	0.345

TABLE 21.—Corn *ripe* 18 October.

Carbonic acid,	Trace.
Silicic acid,	.850
Phosphoric acid, with a little per oxide of iron,	49.210
Lime,	0.075
Magnesia,	17.600
Potash,	23.175
Soda,	3.605
Sodium,	0.160

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torical matter of both essays, but as Mr. Flint has devoted himself to clear away the mists of time, which have obscured the original habitation of our Indian corn, so we find his researches travelling back to Babylonian Agriculture. In truth, he seems to have marshalled before him "all the various and conflicting accounts" of travellers and historians, and weighing them with discretion, to have drawn natural and correct conclusions. As practical farmers, more familiar with the husbandry than the history of Indian corn, we are disposed to think and suggest that a species of corn may be indigenous to Africa, to Egypt especially, and not known in America. We allude to a corn, the description of which is similar to Indian corn, in regard to the stalk and leaf, but the grain is produced at the pinnacle of the stalk where the tassel of the Indian corn shoots forth. This plant has been grown in this country from seed said to be taken from an Egyptian tomb; it rises to 8 and 10 feet in height, and as before said, the stalk and leaves are in all respects like the Indian corn. If so, may we not thus account for one of the links in the chain of difficulty which has long bound the European inquirer.

We think Mr. Flint has been very successful in throwing much and additional interest over the history of Indian corn, and recommend that the thanks of the Society be presented to Mr. Flint for his essay, with a Silver medal.

J. DELAFIELD, *Chairman.*

AN ESSAY ON THE HISTORY AND IMPORTANCE OF INDIAN CORN, AS AN AGRICULTURAL PRODUCT.

BY CHARLES LOUIS FLINT.

The complete history of Indian corn seems never to have been written by an American. The materials for it must be sought in old and uninviting volumes, in the narratives of voyages and travels, and in no less than five or six different languages. The skilful labor required to bring together the various and often conflicting accounts, is by no means small. The writer who would undertake such a task, should possess

Chlorine,	0.520	Chlorine,	0.295
Sulphuric acid,	1.240	Sulphuric acid,	0.515
Organic acids,	2.100	Organic acids,	5.700
	99.675		99.175

The most interesting feature in the two foregoing analyses, is the relative increase of phosphoric acid, and the decrease of the alkalies as the kernels approach maturity.

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much knowledge of the Botany of the western continent, as well as that of Asia and the Asiatic isles, to be able to draw the most natural and correct conclusions of his own. He who shall do it, as it should be done, will render a great service to American Agriculture.

In France, Parmentier published a work on maize, in 1785. This was soon followed by that of Harasti, in Italy, devoted to the practical details of the subject, in 1788. In Germany, Burger published a work on the Natural History and Culture of Maize, in 1809. Still more recently, the labors of Bonafous, in France, have thrown much light and interest upon the same subject. In Spain, though no very valuable work has appeared on the history of maize, such frequent allusions are made to it in the narratives of the voyages of Columbus, Alonzo Negro, Penzon, Vespucci, and Cortez, as to be of great service in determining its native country. The works of Oviedo and Hernandez, also, are worthy of mention. Still more important is the authority of Humboldt.

The word *zea*, which is applied to maize, is derived from a Greek word which signifies *to live;* and the reason of its application is the great amount of nutritive matter which the plant contains. Of all the species of gramina, the *zea mais* is probably the most cultivated. It is annual; and the stems, which are cylindrical, and closed at the nodes, rise to the height of from four to ten feet. The sheaths of the leaves are split, the flowers are in double rowed imbricated bracts, the male flower being placed at the apex of the stem. Each grain is furnished with a style, which extends along the inner side of the sheaths, and hangs like a fine silken thread, forming the tassel. The stamens are three; the seeds are rounded on the surface, compressed at the sides, and arranged in rows. They are extremely farinaceous, or mealy, which gives the plant its value. The varieties are innumerable. These varieties are owing, in part, to difference of culture, climate, and soil. Of these we shall speak more at length hereafter.

Naturalists have long disputed the origin of maize. The question is one of interest, inasmuch as some claim our own as its native country, while others contend that it came from the East. It is proper to state, briefly, the argument as it stands, after which we shall be better able to draw somewhat satisfactory conclusions.

Bock, the first botanist who wrote of it, forty years after the discovery of America, asserts that it came from Arabia, and was called *wheat of Asia,* (ble d'Asie,) *great wheat,* and *great reed.** But four years after, the same opinion is maintained by Ruellius,† whose assertions are perhaps worthy of respect. Fuchsius also declares that it came from Asia

* Hist. Nat. du Mais, p. 11, par M. Bonafous.

† De Natura Stirpium, Lib. xi., c. xxix, p. 428, 1536.

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to Greece, thence to Germany, and was called *wheat of Turkey*, because the Turks at that time possessed all Asia.* Many writers have taken the authority of the old map or chart of Incisa, of the thirteenth century, to prove that it came from the East. Of such we may mention Sismondi,† M. Michaud,‡ Gregory,§ Lonicer,‖ Amoreux,¶ and Reynier,** who was familiar with the history of Agriculture. This chart describes a grain of a golden color, and partly white: "Granis de colore aureo, et partim albo," under the name of *meliga*. Crescenzio describes the method of cultivating this grain, which is very nearly the same as that of cultivating maize at the present day. The Portuguese writer, Sata Roza de Viterbo, also, asserts that it was known in the thirteenth century.†† Whatever may be said of its origin, it seems to have been first introduced into Turkey, from whence it made its way to the West. This is shown by the names which have been given to it in Europe, several of them indicating that it came through Turkey. But according to some Spanish authors, it was brought into Spain by the Arabs.‡‡ A Chinese writer of the middle of the sixteenth century, draws the figure of the maize, as known in China, which is said to correspond with some species of maize now known. Some travellers who have visited the Asiatic isles, have inferred that it was cultivated about the equator, in that vicinity, from great antiquity, and that it passed from these isles into China, and thence to the interior about the Himilaya. John Crawford, who lived for years in the island of Java, says: "Maize is, next to rice, the most important agricultural product among the great tribes of the Indian Archipelago." Mr. Rifaud asserts that some kernels were found in the sarcophagus of a mummy in Thebes, in 1819. The well known orientalist, De Herbelot, mentions§§ a passage of Mirkond, a Persian historian, which might lead us to suppose that maize was known to the old world, long before the discovery of the new.

Now the question arises, whether the meliga described in the old chart of Incisa alluded to, was identical with the zea mais? Bonafous

* De Historia Stirpium, pp. 824-25. 1542.

† Biographie Universalle, Tom. xxix., p. 542. Note.

‡ Histoire des Croisades, 4th ed., Paris: 1826. Tom. iii., pp. 348-9.

§ Annales de l'Agriculture Francaise.

‖ Naturalis Historiæ opus novum. Frankfort: 1551.

¶ Memoire sur le Mais. 1784.

** Feuille d'Agriculture du Canton de Vaud. T. vii.

†† Bonafous Hist. du Mais.

‡‡ Valcarcel, Agricultura General y gobierno de la casa del campo. Valencia. 1768.

§§ Biblioteque Orientale. 1778. Tom. iii., p. 137.

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says on this point, that the description of the meliga from the East corresponds to maize; but that according to the learned author of the Flore d'Egypte, in the description published by order of Napoleon, it can equally well be applied to the millet of India, in which the grains pass, in some of the varieties, from yellow to white. But Cardan says,* distinctly, that maize strongly resembles the plant known in Italy as melica, or *sorghum*, which is the meliga of Incisa. So of several other authorities, as Matthioli and Georges de Turre. Moreover, Bonafous himself declares that it is evident, to look at it, that the meliga is a real maize, and he is therefore inclined to believe that it was known in Asia and Europe before the discovery of America.

After this accumulation of evidence in favor of its Eastern origin, it is worthy of remark that some have even asserted that it was known to the ancient Greeks and Romans. But such conjectures as that the black millet brought from India to Italy, in the time of Pliny,† was the maize, are probably ill founded. Even Mr. St. John, whose great familiarity with the domestic affairs of ancient Greece entitles him to the highest respect, says:‡ "In the region beyond Bactria, a species of corn was found which must unquestionably have been maize, since the grains are said to have been as large as olive stones; and to maize alone can we apply Herodotus' description§ of the wheat found in Babylonia, the straw of which was encircled by leaves four inches in diameter, and its return from two to three hundred fold. Now, in wheat I believe so prodigious an increase is all but impossible; whereas a still greater return might be obtained from the Indian corn." And there have not been wanting those who think that Homer distinctly mentions maize,‖ as well as the naturalist, Theophrastus, in his history of plants,¶ and that allusions are frequently made in the Bible** to a grain that could have been no other than maize or Indian corn. Such was the opinion of William Cobbett.†† It arose, however, from utter ignorance of the

* De Subtilitate. Lib. xxi. p. 389. Basil, 1553.

† Pliny Naturalis Historia. Lib. xxvii.. c. 7.

‡ History of the Manners and Customs of Ancient Greece. Tom. iii., pp. 406–7. London: 1842.

§ Herodotus. Lib. i., § 193, p. 80., of Wheeler's ed. Boston: 1842.

‖ Od. Lib. iv., verses 41 and 604.

¶ Theop. Historia Plantarum. Lib. viii., c. 4. It should be noticed that his description is very general. Speaking of eight kinds of wheat which had been imported into Greece from Asia, he says that one of these varieties was heavier than the rest. May not this have been the variety to which Herodotus alludes, and the same as that which Mr. St. John says was called camel's tooth?

** 2d Kings, iv., 42. Job, xxiv., 24. Leviticus, ii., 14 and xxiii., 14. Deut., xxiii., 24 and 25. Gen. xli., 5. Matt. xii., 1. Ruth, ii., 14, and Sam., xvii., 28.

†† See also Hooker Jour. of Botany, (Classical Plants of Sicily,) 1834, p. 219.

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ancient mode of planting or sowing wheat, which will be alluded to hereafter.

It is now proper to enumerate, briefly, the authorities on the other side of this question; those who believe maize to be indigenous to America, and that the New World should have the credit of having given it to the Old. And here, it may be, we shall find naturalists not less celebrated than those already mentioned. Among the first, in point of time, is Dodonaeus,* who lived in the middle of the sixteenth century, and wrote but shortly after Bock and Fuchsius. After him came Camerarius,† then Matthioli, one of the most learned and justly celebrated men of his time. He affirms‡ that Turkish wheat (*ble Turc*) is not a proper name for maize; that "it should be called Indian wheat, (*ble d'Inde,*) and not Turkish wheat, because it came from the West Indies, and not from Asia nor from Turkey, as Fuchsius believes." So Ray§ and others say that Fuchsius was mistaken, and that it came from the New World. M. Dumeril thinks it was called Turkey wheat in consequence of its long stalks. So the authority of Heynius is to the same effect: "Turcici nomen non ex vulgo accepit, quod ex Turcorum terris exportatum fuit, verum *ab aristarum similitudine aliqua cum crista seu pluma in apice Turcorum capitibus imposita.*"

Gerarde, after describing several kinds of "Turkey wheat,"‖ which were evidently species of maize, goes on to say: "These kinds of grain were first brought into Spain and then into the other provinces of Europe, not, as some suppose, out of Asia Minor, which is the Turk's dominions, but out of America and the islands adjoining, as out of

* Stirpium Historiae Pemptades. Antwerp: 1583.

† Hortus medicus et philosophicus. Frankfort: 1588.

‡ I Discorsi nei sei libri di Dioscoride. 1645. Described also in the Commentari in lib. primum Dioscoridis. p. 319. 1598.

§ Historia Plantarum. London: 1686.

‖ Herball or General Historie of Plantes, p. 82, London, 1633. This curious old work contains plates of the different species of maize then known, as well as the millet and the sorghum with which the maize was often confounded. The plates show a very marked difference. It is amusing to see how little the true qualities of maize were known at this time in England. Turkey wheat, he says, doth nourish far less than either wheat, rye, barley or, oats. The bread which is made thereof is meanly white without bran; it is hard and dry as bisket is, and hath in it no clamines at all; for which cause, it is hard of digestion and yieldeth to the body little or no nourishment; it slowly descendeth and bindeth as that doth which is made of Millit or Panick. We have as yet, no certain proof or experience concerning the virtues of this kind of corn; although the barbarous Indians, which know no better, are constrained to make a virtue of necessity and think it a good food; whereas we may easily judge that it nourisheth but little, and is of hard and evil digestion, a more convenient food for swine than for men!

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Florida and Virginia, or Norembega where they used to sow, or to set it, and to make bread of it, where it groweth much higher than in other countries." He also takes care to say that it was not known to the ancient Greek and Latin authors. M. Parmentier is of opinion that it had American origin.

M. E. Discourtilz also says maize was introduced into Europe by the Spaniards, who brought it from Peru.* It is important to mention, also, the authority of Thomas Nuttall,† who thinks it was indigenous to tropical America. The same conviction is expressed by the learned Mrs. Somerville.‡

It remains to speak of the important conclusions of Baron Humboldt. "It is no longer doubted," says this learned naturalist, in his Essay on New Spain, "it is no longer doubted among botanists, that maize, or Turkey corn, is a true American grain, and that the old continent received it from the new." Again, he says: "On the discovery of America by the Europeans, the zea maize (*tlaolli* in the Aztec language, *makiz* in the Haitian) was cultivated from the most southern part of Chili to Pennsylvania." Massachusetts, he might have said, for such was the case. "According to a tradition of the Aztec people, the Toultecs in the seventh century of our era, were the first who introduced into Mexico the cultivation of maize, cotton and pimento. It might happen, however, that these different branches of Agriculture existed before the Toultecs, and that this nation, the great civilization of which has been celebrated by the historians, merely extended them successfully. Hernandez informs us, that the Otamites even, who were only a wandering and barbarous people, planted maize." Thus we see it was cultivated in America long before the discovery, and formed a most important article of food for centuries.

Having candidly stated the various authorities on this question, we are now prepared to proceed in our investigation. And first, let us say, that though we should consider it no small gift of the new world to the old, it is not difficult, on a question which does not affect either personal or national honor to free our minds from prejudice and partiality, and study with a desire to ascertain and establish the truth. We are not convinced by the assertions of some or by the arguments of Bonfous and others, to prove that maize originated in the east. They have not made out a satisfactory case. It should be borne in mind that the authority of the early writers is not always to be relied upon. They possessed none of the advantages which modern science has laid open,

*Flore Pittoresque et Medicale des Antelles, Paris, 1829.
†Nuttall's Works, vol. 1, p. 203.
‡Physical Geography, p. 274.

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to pursue their investigations. They could not be accurate on questions of this nature. It is very probable that maize came into Europe by way of Turkey and the Levant, which gave it the name which it then bore, of Turkish wheat, &c., and which would be likely to deceive a naturalist of the sixteenth century, in regard to its origin. Then it is very easy to conceive how a careless statement made by a writer three hundred years ago, would be taken on his authority, and thus gain a credit which it did not deserve. Instances of this occur on almost every page of the old historical writers, as any one who is at all familiar with the works of Sir Thomas More and the old chroniclers, can testify.

It is a remarkable fact that maize is not mentioned by travellers who visited Asia and Africa before the discovery of America. These travellers to foreign parts were often very minute in their descriptions of the productions of the soil. But the maize was never described in Europe until after the discovery. This, most certainly argues very strongly that it was not known.

It is also a remarkable fact that it was universally cultivated on the western continent at the time when the Europeans landed here. This is proved by P. Martyr,* Ercilla,† Jean de Lery,‡ not to mention Torquemada§ and others, who tell us that the first Europeans who set foot on the new world saw among other wonders a gigantic wheat with long stalks, and that this wonderful wheat was the maize. The harvesting of it was celebrated by the people with religious festivals. Sacrifices were prepared with it. With it the Mexicans formed idols. It constituted almost the only food for all the tribes in Mexico, in Peru, in Brazil, at the Orinoco and the Antilles. It served for money. A theft of seven ears the Mexican laws punished with death.

It is a still more curious fact that immediately after its introduction into Europe, it spread with great rapidity into every country and province where the climate was thought to be suited to it. Now if it had been known in Asia, if it had been cultivated by the Turks, how could all these things have happened? Why was not so useful a grain introduced into Europe before, or why did it spread so rapidly when it was introduced? A somewhat extensive trade was carried on between Europe and some of the Asiatic isles long before the sixteenth century, so that if Indian corn had been known or cultivated in Asia, there is every probability that it would have found its way into Europe. The plant called *sorghum* was known and cultivated in Europe and some-

* De Orbe novo decades, III. 1516.
† Alonzo de Ercilla, Araucana, Madrid, 1577.
‡ Historia d'un voyage fait en la terre du Bresil, 1728.
§ Della Monarquia Indiana Tom, I. p. 158.

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what in Asia and Africa, and this it was with which maize was so often confounded. This, however, was not a species of Indian corn.

But the strongest evidence of its American origin is, it seems to us, that it has been found growing wild in some parts of the western continent,* which is not the case in any other part of the world. This alone would seem to prove it to be indigenous to America. We need say nothing of the fact that grains of Indian corn have been found in the mounds of Peru. These mounds were probably built three or four hundred years before the conquest. There can be no doubt therefore that it was cultivated on this continent from time immemorial.

But it may now be asked, how are we to explain the numerous allusions to a grain, which if not Indian corn, must have nearly resembled it? We have already remarked that many of the assertions of the early botanists confounded maize with sorghum. Other allusions, and those by the sacred writers, refer to wheat, which was indigenous to Asia, and almost universally cultivated. Mr. St. John admits† that there was, and still is, in that part of the world, "a very large grained wheat called camel's tooth," which would naturally have given rise to the expression, "ears of corn," so often used. The misconceptions of Mr. Cobbett and others in regard to these references, arise from ignorance of the ancient mode of sowing wheat, or corn, as it was universally called by the old writers. Large fields of it were sown, between which a narrow road or path was left for the public. This road was just wide enough for the carriage to pass without injury to the grain, there being no fences for protection, so that it might literally be called "going through the cornfields." It was sometimes gathered with the sickle, sometimes by passing through it and plucking off the heads or ears, the reaper having an apron or pouch to drop them into.

Neither wheat nor rice were known to the first inhabitants of America and we may with as much truth say that Indian corn, and the potato were neither cultivated in Asia nor the South Sea Islands.

It is well known that maize was introduced into Japan by the Chinese.‡ But there are no grounds for believing that the Chinese themselves possessed it until the sixteenth century. We persist then, with Humboldt, in believing that maize was not transported from the center of Asia to the table lands of Mexico. And, moreover, if we suppose that it was thus transported from Asia, how are we to account for the infinite varieties found in America which, most certainly, were not

* A variety has been found in Paraguay which the Indians say grows wild in the woods.

† History of the manners and customs of ancient Greece, Tom III. p. 407.

‡ Thunberg, Flora Japonica, p. 37.

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found in Asia? Is it not more natural to suppose it to have originated where every variety of it was found, than where only one or two varieties, and those doubtful ones, were ever known to grow before the discovery of America by the Europeans? We may remark, also, that if we suppose that a species of maize was actually known in Central Asia, or to the Chinese, it may have been the case that the Indians of the extreme N. W. of America had communication with the extreme N. E. of Asia, and that some one or two species, by this means, found their way into Asia. If such communication existed, which we do not believe, the fact that it was found in China and about the Himalaya, which is by no means established, would not prove it to be indigenous to Asia. Or, if one or two species were actually found, the fact that there were no more in Asia, and so many in America, would be a strong evidence of its being exotic in Asia.

This accumulative evidence seems to us to be satisfactory and conclusive. It was the custom among some of the earlier writers, to speak of America as being sterile and wanting in the most important vegetable productions. They little suspected the surpassing richness of the country which had been made known to astonished Europe. The infinite variety of plants indigenous to Mexico, to Central and to South America, where we suppose maize to have originated, is beyond description. No country on the globe can excel them in the boundless luxuriance of native, indigenous plants. Here even the giant trees of the forest are loaded with flowers of every hue and variety. The purple and the blue and the scarlet, the brilliant yellow and white, twine and mingle with every variety of green. Here are the fig, the sugar-cane, the indigo, the aloe and the pepper plants, the passifloreæ, the pine apple and the endless varieties of the cactus with its splendid and variegated blossoms. Here is the night flowering cereus, the alspice myrtle, the clove, the nutmeg, mango guava and an infinite variety of palms, rising often to the height of two hundred feet. Here too, are forests of logwood and mahogany, of colossal grandeur, often surrounded with shrubbery and parasitic plants, with a foliage so dense that the rays of the sun can never penetrate. Here is the mimosa, majestic in its size, the beautiful acacia, and grasses that rise to the height of forty and fifty feet, with tree ferns and reeds without number, often seen a hundred feet high. The golden and rose-colored bignonias add their grace and beauty to the teeming masses of blooming life. The laurels become splendid forests. Plantains grow to gigantic size, and beneath all spring lilies and bulbous plants, as if not an inch of soil could be

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spared. Here also the endless variety of creeping plants rise through the twining limbs with their myriad and brilliant flowers. Thousands of species still remain undescribed, and there may be thick and tangled forests which the foot of civilized man has never trodden. Nor is this rich luxuriance for a season alone; for the spring, or the summer, or the autumn. It is everlasting. The unfading verdure hides the very appearance of death. The trunks of the decayed, matted and heaped together, form only rich beds for the living to spring forth in the newness of life. The eye is sated with beauty. The air is filled with perfumes, and one is lost in wonder and amazement at nature herself. This is the native country of maize. A country unparalleled in the magnificence of its flora, and unequalled in the depth and richness of its soil!

The importance and value of Indian corn are too well known to every practical agriculturalist, to need illustration. Upon this part of our subject we shall dwell but briefly. On every part of the globe where the hand of civilization has broken the turf, this beautiful grain receives a large share of attention. In the western continent it is raised from Canada to Patagonia, and the islands of the South Sea, through almost every variety of climate and people, and over an extent from north to south of more than seven thousand miles. It was introduced into Africa by the Portuguese in the sixteenth century, and is cultivated more or less from the Mediterranean Sea and the Libyan Desert to the Cape of Good Hope. In Java and the Asiatic isles it forms an important product. In central Asia, it is known and valued, as well as in Australia and the islands of the Indian Ocean. In Europe, it is extensively produced, in Hungary, in Lombardy, in France and Spain, and we might almost say from the Ural chain to the Atlantic. No grain could secure such favor from all parts of the world, except from its intrinsic value. No other grain, in fact, except rice, is so extensively cultivated.

Its flexibility of organization makes it very easy of adaptation to climate and soil. Though it prefers moist and rich soils with strong heats, there are varieties of it which can be raised in tropical climates at a height of more than nine thousand feet above the level of the sea. The warmest regions of the torrid zone produce maize in abundance, where three crops can be taken in a season, while the short summers of Canada have a variety adapted to them. This cannot be said of rice, which requires great heats, and cannot endure a climate of high latitude. It is proper here to notice briefly the more important varieties of Indian corn. There is one common in Hungary, which M. Parmen-

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tier endeavored to introduce into France. It ripens in two months. A still more remarkable kind is mentioned by Oviedo* as being cultivated on the shores of the South Sea, which ripens in less than forty days. There are to be found in Spain alone, no less than one hundred and thirty different varieties. The varieties most common and valued here, are the large yellow, the red, which differs from it only in color, the sweet corn, and what is perhaps, the most important, the Canada corn, known best in Maine and Canada from its early ripening. Its yield is thought to be equal to the larger varieties. Seventy-five bushels of it, to the acre, have been raised at Nahant, as exposed a place, doubtless, as any in the country. The Egyptian corn has been preferred by some, while Cobbett's has the preference with others. These varieties have been tried together, in the same field, and the Egyptian found to be the earliest, and the Quarantine, or Cobbett's, next. There is also a variety called Valparaiso,—sometimes, also, called Oregon corn, which, when roasted, splits in the form of a cross. A species called Tunicate, is found in Paraguay and in some parts of Oregon. Each kernel is covered with a glume, or husk. Owing to the difficulty of separating the grain from the glumes, it is of little value. The *Zea caragua* is a corn found in Chili, said to be hardy and long-lived. Nuttall describes a variety called the early Mandan corn, cultivated by the Aborigines about the Missouri. It ripens in a climate where no other variety could exist. Other varieties might be described, but it is sufficient to say they probably all sprung from the common yellow, and that they differ from each other only in the color, form and size of the grains, and in the time of maturity.

Indian corn ripens at a time when most other grains have been harvested. It therefore gives employment when there would naturally be but little else to do. But what gives to Indian corn its great importance, is the actual amount of nutritive matter which it contains. It is said to be third in this respect, wheat and rice containing a somewhat greater amount, though many place maize second only to wheat. We have the analysis of Indian corn, which may be given as follows:

Silica,	38.45
Potassa,	19.51
Phos. of lime,	17.17
Phos. of magnesia,	13.83
Phos. of potassa,	2.24
Carbonate of lime,	2.50

* Lib. vii., c. i., p. 103.

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Carb. of magnesia,	2.16
Sulph. of lime and magnesia,	79
Silica, mechanically found,	1.70
Alumina and loss,	1.65—100

making in all one hundred parts. In other words, we may say, on the authority of Dr. Dana, of Lowell, there are in it of

Fat forming principles, gums, &c.,	88.43
Flesh forming principles, gluten, &c.,	1.26
Water,	9
Salts,*	1.31—100

A glance will show how greatly the fat forming principles predominate in the one hundred parts. There is hardly any grain which yields so much for the support of animal life. The difficulties and contingencies of raising wheat in the eastern parts of Massachusetts have discouraged its cultivation, so that we may say that Indian corn is by far the most profitable crop, especially, as, when the offal is properly managed, there is no grain which restores so much to the ground. It is a fact, too, that it may be cultivated longer in succession than any other grain; and if kept dry, it may be preserved for an indefinite period without injury. The ease and rapidity with which it recovers from a drought is truly remarkable. Many predicted during the last summer that the corn crop would be destroyed. The leaves were badly curled, and there was every indication that the crop would greatly suffer. Every one remembers how speedy was its recovery, and how rapid its growth after the change of weather. As a fattener for cattle, swine and poultry, we may say that Indian corn is unrivalled in utility. The analysis of Dr. Dana, as given above, is sufficient to show, at once, how important it is for such purposes. As a food for man it is extensively used, though by some thought to be too stimulating.

The most common mode of cultivating, is to plant in hills about four feet apart. But our impression is, that where the largest crops have been obtained, the seed has been sown in rows or drills. In either case, it is now pretty well settled among farmers, that it should not be hilled, as was the custom but a few years since. There seems to be several reasons for this. If the earth is drawn up around the stalk at the last hoeing, it sends out new roots, which divert much of the nourishment which would otherwise have gone into the stalk and the ear. It is not unfrequently the case that *aerial* roots, even, are emitted from the lower joints of the stem above ground, and descending, fix themselves in the

* For complete analysis, made by J. H. Salisbury, see Trans. 1848 page 786-7.

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soil. This takes place on a very much larger scale, if these joints are surrounded with earth. If the earth is taken from the intermediate spaces, so as to leave hollows, the long branching roots become exposed to the sun, and cause the plant to feel the drought too severely. Kelp, which washes up in winrows upon the sea-shore, has been found to be of valuable assistance to maize. It should be equally spread over the ground and plowed in.

But it was not our design to allude to the modes of production. Every practical farmer is already familiar with these from experience, to say nothing of the easy access to our well conducted agricultural journals, which keep up with every new improvement in all departments of husbandry. If we have succeeded in throwing some light and interest over the history of this valuable grain, our aims are accomplished.

In conclusion, we would say, that if America has furnished the Old World with maize, the potato, tobacco, cocoa, vanilla, and other plants useful to man, she is herself indebted to the eastern continent for wheat, barley, oats and rice, for the coffee plant, now one of her staple products, for oranges, lemons, peaches, and many other plants which now grow in great luxuriance both in the tropics and in our temperate climates. These plants Europe had been receiving for more than twenty centuries, from the Greeks and Romans, and from the nations of the east, till they had accumulated in rich profusion upon her western shores. Now, many of them, together with many of our own, are borne on to the islands of the South Sea, still further west, whither the restless march of civilization is tending. The natural gifts of one country to another, facilitated by commerce and the arts, are fast binding together the remotest corners of the globe. Let the full tide of civilization roll on! Let commerce bear to every land, and to every island in the sea, products which shall humanize mankind, and increase the aggregate of comfort and happiness! These are the fruits of peace!

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ELEMENTS OF SCIENTIFIC AGRICULTURE FOR SCHOOLS.

Committee.—John Delafield, Oaklands; John P. Beekman, Kinderhook; George Geddes, Fairmount.

One of the most prominent obstacles to the diffusion of scientific Agriculture, has been the seeming abstractions of men of science, shrouded by mystic terms and symbols, which present an insuperable barrier to the extension or practical application of their theories and systems. We will not deny to the student or philosopher the facility of communicating with men of science in other climes, and with each other, by a technical language familiar to them alone, but we may with some propriety press upon them the plain fact, that the labor of the closet and laboratory, and the labor of the agriculturist, have but one and the same end; the man of science investigates first principles, the farmer applies them. How, then, shall a right conclusion be had, if investigations are communicated in an unknown tongue? Hitherto the farmer has viewed the cabalistic terms of science with dismay, inducing a belief that the student was engaged in profitless pursuits; while the student, ardent in the race for truth, has looked with regret upon the supposed indifference of the farmer. Thus misconception has too long deprived both of that *mutual aid*, which alone can produce the desired result of benefit to man.

The educational system of the State of New-York has happily advanced the people to a position from whence they now look with respect and interest to the powers and benefits of science; they see with admiration the advances made in every art, and the agriculturist endeavors to curb in patience his desire for a higher position.

The philosopher, rejoicing in the advance of general knowledge, breaks away from the chains of technical terms of science, and meeting us in our own familiar language, finds an apt and ready appliance of means derived from science, to produce the greatest amount of products at the least cost, consistent with keeping the soil in a condition of undiminished fertility: The intimate connection of science with Agriculture; the important use of investigations carefully made; the easy comprehension of principles upon which every farmer depends for success, are admirably and clearly exhibited in the essay of Professor J. P. NORTON, on the "Elements of Scientific Agriculture," now presented to the State Agricultural Society. In an easy and most agreeable manner, the elements of plants are explained, not by assumption

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or bold assertion, but by proof so simple and so easily exhibited to the eye as well as the ear, as not to admit of doubt; the mind is convinced that no farmer can cultivate his land with *full success* without such knowledge; and as is stated, upon the result of the investigation of the ash of plants, depend many of the most important discoveries in agriculture.

The sources of the food of plants are explained with a reasoning so apt, and experiments easily performed, that we reach the conclusion of this branch of the essay, without doubt or perplexity. The composition of soils, their improvement and their relationship to plants, are so treated as to present in a striking manner, the proper management of the several characters of soil. The effects of cropping on the soil, the system of rotation, present facts as important as they are interesting; while the composition of our various crops exhibits to us, among other facts, the relative amount of nutritive matter produced per acre.

As the composition of crops has a direct connection with the food of animals, the subject of feeding is treated at large, and with good discretion, having reference to the high condition of the animal, the products of flesh, milk, butter, cheese, and the important article of *manure*. This branch of the essay is highly interesting to the practical farmer, and will arrest the close attention of every reader. As no farm can be kept in a fertile condition without the application of some fertilizing substance, and as these substances are far from being abundant on the farms of this State, we may with great advantage peruse again and again the chapters devoted to manures, and we shall arise from the perusal of this essay with stronger convictions of the utility, nay, indispensable necessity for the close and intimate connection of science with Agriculture. This conviction is the stronger, because facts and principles are presented to our minds in plain terms, "without hard words or obscure phrases," and the experiments are so described that every man may repeat them at his pleasure.

As a work of science, it embodies every principle and fundamental feature of Agriculture which has been developed to this period, and having the stamp of truth arrayed in simple yet perspicuous language, it would seem expedient that no effort should be spared, to carry this work to the home of every man, whether directly or remotely connected with the pursuit of Agriculture. Until science shall unfold to us other facts, and further developments of Nature's laws, this work should be the elementary text book for every person, old or young, who studies the cultivation of the earth; it should form a prominent object in every school district of the State, and be strong alike in the affections of teacher and pupil.

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We cannot better conclude our notice of this essay, than in the language of Professor Norton, to "relate the beautiful *connexion* which exists in every branch of scientific Agriculture." We "may follow any "particular substance from the soil to the plant, from the plant to the "animal, and finally back to the soil again. In all of its changes it "remains the same in its nature, but is constantly presented to us in "new forms. We see that there is an endless chain from the earth up "to the animal, then back to the earth again. By watching this chain "and the various transformations during its course, we may hope to "grow constantly wiser, in every department of Agriculture."

Believing, as we do, that Professor Norton has well and abundantly shown the importance "of scientific knowledge in prosecuting successfully the ordinary pursuits of agriculture, presenting scientific truths, divested as far as practicable of technicalities, we adjudge to him the premium of ONE HUNDRED DOLLARS; the copyright to remain with the author, and that a recommendation be issued from the State Agricultural Society that this work should be adopted by the publishers of books for the school district libraries, among their works for general circulation.

J. DELAFIELD, *Chairman.*
J. P. BEEKMAN,
GEORGE GEDDES,

(The work by Prof. Norton will be found at the close of the volume.)

The Hon. J. P. Beekman, after the above report was read, offered the following resolution:

Resolved, That the essay be referred to the Executive committee for their examination, and that if they consider it worthy, that they cause to be printed *one thousand copies*, at the expense of the Society; the volumes to be awarded as premiums of the Society. (The above resolution was unanimously adopted.)

At a meeting of the Executive committee, held on the 18th of January, the Secretary presented the above resolution for consideration. The work of Prof. Norton having been examined by members of the board, who entirely concurred in the very able report of the committee, as to the merits and value of the work. The recommendation for its publication, to be awarded as premiums, was unanimously concurred in.

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DAIRIES.

Committee.—B. P. Johnson, Joseph Carey.

The importance of the dairy interest is every year becoming more and more apparent, and increased numbers of our farmers are turning their attention to it. It has been the object of the Society to perfect the manufacture of butter and cheese, and thus secure to our dairymen, not only the highest price for their products, but the best markets in our own country and in foreign lands. The committee, from the information they have obtained from various portions of our State, from the most intelligent as well as successful dairymen, are satisfied, that the laudable objects of the Society have, in a measure at least, been accomplished. The quality of butter and cheese is yearly improving, and although very many of our dairymen are sadly deficient, yet the fact that every year witnesses an addition to the number of excellent dairies, is in the highest degree encouraging, and should stimulate the Society to continue and extend their efforts in this direction. The *keeping* qualities of much of our butter has been established, so that the purchaser is no longer compelled to make his selection from a *single locality*, but has the choice of hundreds of dairies, from which he may select his butter, that will stand the test of climate. It is in the highest degree inexpedient to send inferior butter or cheese to foreign markets. Loss to the shipper is invariably the result. The inferior butter sent from this country to England is classed as grease, and brings no higher price than what its designation implies, while butter made as it should be, commands a remunerating price. So also with cheese. Our best Herkimer dairies, whose character is as well known in the London and Liverpool markets, as in New-York, will command within a few shillings sterling, the price of the best English dairies, and frequently the same price, while inferior cheese is sold from ten to fifteen shillings sterling per 100 lbs. less. But this is true not only of the foreign market, a difference to nearly the same extent exists here, and the poor and indifferent article sells at a very diminished rate from that made in prime and choice dairies. It is then important to press upon our dairymen the necessity of care and attention in the preparation of their butter and cheese. There is no inherent difficulty in producing a good article in most parts of this State, and if the requisite knowledge is acquired, and suitable preparations for making secured, the dairy-maid need not make

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an inferior article, and if she does, the fault must rest upon her. The exhibition at the Annual Fair, as well as the samples on exhibition at this time, are of such a character as to satisfy the most fastidious; and what has been done in these cases, may be done in a thousand others, if the same attention and skill is directed to the object.

The Society has endeavored to ascertain the breed of cattle best adapted to the purposes of the dairy, but as yet cannot learn from the competitors that there can be any decision as to particular breeds in this State which are preferable. From an examination of the statements of all the competitors at Syracuse, eleven in number, who referred to their cows, *nine* were of what is called the *native* breed, and *two* mixed more or less *with Durhams* or short horns. In the trial of five cows for thirty successive days, it will be seen, Mr. Holbert's five cows made, in thirty days, from 23d May to 21st of June, 264¼ lbs. of butter, averaging over 1⅞ lbs. per day each. His cows were native, with a slight mixture of Durham—what proportion is not stated. Mr. Nelson Van Ness, of Westfield, made 221 lbs. in thirty successive days, averaging nearly 1⅛ lbs. each per day. His cows are stated to be the common native breed. The only trial which has been made in this State with pure short horn cows, as to their dairy qualities, which has come to our knowledge, was made by George Vail, Esq., in 1844. He had six cows, from whose milk, in thirty successive days, he made 262 lbs. 9 oz., averaging 43 lbs. 12 oz. per cow—not quite 1½ lbs. per day. One ofthe cows, whose milk was kept separate, made 52 lbs. 9 oz. of butter, being 1⅞ lbs. per day. Mr. Vail has continued the manufacture of butter from his herd of short horns since that time, and we believe with satisfactory results.

As a matter of interest, doubtless, to many, we give a statement of the quantity of milk and butter from some of the most celebrated dairy cows. There are few persons conversant with our agricultural journals, but what have heard of the celebrated Cramp cow, owned in Lewes, England, of the Sussex breed, which, during four years, from 1805 to the end of 1808, yielded the extraordinary amount of 23,559 quarts of milk producing 2,132 lbs. of butter! The largest average product which has been stated by any writer in whose practical experience confidence can be placed is that of Mr. Aiton, who rates the yearly average return of the best kyloes at 4,000 quarts within 300 days, or until they were dry.—*British Husbandry*, vol. 2, page 403.

First 50 days,	24	quarts	per day,	1,200
Second "	20	"		1,000
Third "	14	"		700
Fourth "	8	"		400

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Fifth	"	8	"	 400
Sixth	"	6	"	 300

He cites an extensive Ayrshire dairyman, who says: "That he would not keep a cow on his farm that did not yield her own value, or her weight in sweet-milk cheese every year." He admits, however, "that many cows will not yield more than half that quantity—4,000 quarts; and that probably 600 gallons in the course of the year may be about a fair average of the Ayrshire stock."—*Survey of Ayrshire*, p. 464. The average quantity of milk yielded by dairy cows in England is stated, in three counties, as follows:

In Devon,.....	12 quarts per day
Cheshire,.....	8 "
Lancashire,.....	8 to 9 "

Five short horned cows, of the ordinary quality of that breed, are stated to have given in one year as follows:

One which did not go dry at all,.....	4,857 wine quarts
" dry eight weeks,.....	3,985 "
" dry four weeks,.....	3,987 "
" dry four weeks,.....	3,695 "
" dry eighteen weeks,.....	3,383 "

These cows were in summer at grass—and in the winter on hay and turnips, with two months on hay alone. "A large dairy of Long-horns and Short-horns, at the late Mr. Curwen's farm of Workington Hall, gave upon an average of four years, about 3,700 quarts each. *Survey of Lancashire*, p. 547. In some trials made at Bradly Hall, the seat of the Earl of Chesterfield, in Derbyshire, it was found, that during the height of the season, the milk and butter produced per day by different cows was as follows:

By the Holderness,	7 gals. 1 qt.	38½ oz butter.
" Ayrshire,	5 "	34
" Alderney,	4 " 3 "	25
" Devon,	4 " 1 pt.	28

But this only lasts for a short time, and such extraordinary supplies soon fall off; in fact the nature of the land, the oldness of the pasture, the age of the stock, and the state of the season, have each a separate influence. Generally speaking, a fair annual product from each cow in good condition may be considered as about 160 to 180 lbs. of butter of superior quality, and 350 to 400 lbs. of whole milk cheese, with a small quantity of whey butter, (*British Hus.* 2 vol., p. 406.)

The most productive cow in butter, the late Mr. Colman found in

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Great Britain, was a *North Devon cow*, which produced for several weeks in succession 21 lbs. of butter per week, without extra feed. The North Devon cows of Lord Leicester's tenant, Mr. Bloomfield, averages 4 lbs. of butter per week, through the year,=208 lbs., (*Col. Tour.* 2 vol. p. 324.) Among the most extraordinary cows in this country, we give the following from Massachusetts, which we take from the report of the committee on the dairy in Essex Co., 1849.

Date.	Name.	Place.	Weekly produce.	Length of time.
1826.	Oakes cow,	Danvers,	16 lbs.	16 weeks.
1824.	Nourse "	"	14	16 "
1828.	Sanderson cow,	Waltham,	14	16 "
1830.	Homers "	Bedford,	14	12 "
1830.	Hazeltine "	Haverhill,	14	12 "
1830.	Bassett "	Northampton,	16	12 "
1845.	Buxton "	Danvers,	16	12 "

These cows show a product of more than two pounds per day each, for a period of three months. John Hare Powell, of Pennsylvania, had a Short Horn cow, which produced in 3 days, 8 lbs. 13 oz. butter, or at the rate of 20½ lbs. per week.

We give the amount of butter made from several cows in this State:

George Kier, East Broomfield, Ontario co., from his native cow, 19 lbs. one week, and 16 lbs. for two succeeding weeks.

Franklin Comstock of Kirkland, Oneida co. ¾ Native ¼ Durham, ten year old cow, made 17 lbs. 5 oz. butter in one week.

C. W. Taylor, Truxton, Cortland co., 58 lbs. 6 oz. butter in 4 weeks, about 14 lbs. 6 oz. per week.

Charles D. Miller of Peterboro, Madison co., made in one week from a cow of his, 20¼ lbs. of butter, and in a very unfavorable week in June 15 lbs. This cow was an enormous feeder. Her milk weighed at night, has been found to average 34 lbs.

John Lossing, Albany, a short horn cow, in 7 days, made 14 lbs. of butter, besides the milk and cream for a family of 5 persons.

Philip Van Benscoten of La Grange, Dutchess co.; in 1844 from 5 cows in 30 days, made 227 lbs. of butter, averaging 45 lbs. 6 oz. to each cow.

George A. Mason of Jordan, Onondaga co.; in 30 days made 67¼ lbs. of butter from the milk of one cow; during the first 14 days, the average was 2¼ lbs. per day; and it is believed it would have continued the same during the trial, had not the weather proved unfavorable.

P. H. Schenck of Matteawan, Dutchess co., made 15 lbs. of butter per week, from a polled cow. In 21 days he made 65¼ lbs. of butter,

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or upwards of 24 lbs. per day, and on one day from 154 quarts of milk he made 3 lbs. 8 oz. of butter.

This list might be extended much farther; but it is sufficient for our present purpose. By a reference to the census of 1845, it will be found that the average product of dairy cows in this State, as returned, was, by estimation, in butter, about 90 lbs. per cow, and cheese about 110 lbs. By a reference to the Transactions of the Society, 1846, p. 130, it will be seen that the average product of one dairy in Herkimer, was 650 lbs. cheese per cow for three successive years; and many dairies in that and other counties, now average, it is believed, 500 lbs. per cow. The average amount of butter from Mr. Clapp's dairy, it will be seen, is 170 lbs. per cow, and several dairies are reported in the county reports, exceeding 200 lbs. From a comparison of the yield of butter from particular cows, and the general estimate for the State, it is apparent that our dairymen have much yet to do, to obtain what they should from their dairies. But we are satisfied there is an advance making each year, from the information we are receiving from different dairy districts in our State, as well as from our own observation.

The *Ayrshire* breed of cattle has long had a reputation as to their superiority for the dairy, and as this breed is introduced to some extent in this and other States, it is believed that an account of the breed, with some observations on the proper management of cows intended for the dairy, as well as on dairy husbandry generally, will be useful. The remarks which follow, are from an article by William Aiton, of Strathaven, Scotland, published in 1812. Mr. Aiton is quoted by English writers as entirely reliable authority.

"The dairy is suited to every species of land (in Scotland) except wastes that are not reclaimable. Of dairy animals: there is a degree of pliancy in animal economy, which renders many of them capable of being wonderfully changed by human industry; and that pliancy is not more conspicuous in any animal than the cow; the varieties of which, with their diversities of shapes, sizes, dispositions and capacities are truly wonderful. The *Uris*, of Lithunia, is nearly as large as the elephant, while *Kyloes*, of some of the Highland districts and islands, are not much larger than the goat. The *Bison* has a mane like the lion, a beard like the goat, and a hump like the camel; but all these are laid aside when the animal is domesticated. Domestication and treatment produce change no less surprising in the dispositions of these animals. Our dairy cows are so feeble and overfed, that they are injured by travelling even slowly, half a mile to their pasture; while those of the Tartars, are used for the saddle and in drawing carriages. These are not

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so many different species, but merely varieties in the breed of the same animal; and the diversity of size, shapes, qualities and dispositions, are the effect of climate, rearing and treatment. If such changes have already been made, what may not yet be effected? If a savage animal, dressed in the wild insignia of nature, has been by human industry formed into so many varieties, differing so much in aspect, size and qualities, and fit to be converted into so many different uses, what may not yet be effected on that animal, by the sagacity and industry of man? The following well known adage, of great antiquity, respecting Ayrshire, shows that Cunningham was celebrated for making butter and cheese, long before the reign of any of the Stewarts. The adage is—

Kyle for a man,
Carrick for a cow,
Cunningham for butter and cheese; and
Galloway for *woo'*.

From the adage above quoted, it would appear that the particular boast of Carrick in remote times, was their cows; these however, were not of the dairy kind, but of what are now termed the Galloway breed. The dairy cows were not introduced into Carrick until 1790.

The dairy breed of cows in the county of Ayr having obtained a degree of celebrity beyond any in North Britain, it is desirable to trace their origin. I am old enough to remember that, between 1760 and 1770, nothing of the shape or color of the present breed was to be met with in the district of Cunningham. Some of a red or brown color might then be seen, but nine out of every ten cows in that district were at that time black; hence all description of cows in Ayrshire were then termed "black cattle." The cows of that part of Ayrshire were then generally from twelve to fifteen, and few of them more than eighteen stones weight of saleable meat, when fattened, of 24 ounces to the pound. Being driven round their bare leys in summer, with horses, sheep, and young cattle, and getting no other food in winter but a scanty supply of oat-straw, with what they could collect in the fields, they had the aspect of starvelings; large, high standing horns, with deep ringlets at their roots; their hair coarse, and standing up; their skin thick, and adhering to the bones; their bones large, bodies lank; few of them yielding more than two, or at most three, Scotch pints of milk per day. This starveling breed of cows in Ayrshire, in the course of the last forty years, has been gradually, and as it were imperceptibly, changed into something very different in point of size, shapes, qualities, and general aspect. But though an eye witness of the progress of that important change, and recently have made all possible inquiry, I am not

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able to account for it otherwise than by greater attention to crossing, rearing, and feeding. Some have alleged that the dairy breed of Ayrshire have come from Holland, and others have ascribed to them an English origin. I have no doubt but a tinge of foreign blood may have come into their veins; but I am confident that the breed is chiefly indigenous, and that the principal improvement upon that breed has been by better feeding and treatment. The Earl of Marchmont, about the year 1750, purchased from the Bishop of Durham several cows and a bull, of the Teeswater or some other English breed, of the *same brown color*, into which the dairy stock of Ayrshire has since been changed. These were crossed with the stock of many farmers. Several cows of a brown color were introduced by gentlemen and noblemen into Ayrshire, at about the same period, from about Glasgow. They were of greater size than the native breed of Scotland; and some of these having, from time to time, been carried into different parts of the county of Ayr, and being generally placed on richer pasture, and better fed than the ordinary farm stock were at that time, they yielded a greater quantity of milk, and the farmers became eager to procure calves or crosses with them, in hopes of getting similar returns from their progeny. I have not been fully satisfied as to the origin of this stranger breed; they were termed Dutch cows by some, and English cows by others. But from whatever quarter they may have come, it is from them that the brown color, now so universal in the Ayrshire dairy breed, has become fashionable. Perhaps something of the other qualities of that breed may also have descended to the Ayrshire dairy cows by crossing with them. But I am not of opinion that the present stock of Ayrshire are either completely descended, or that their superior excellence has been entirely derived from these strangers. I am persuaded that they have been brought to their improved state chiefly by better feeding and treatment.

As the dairy has been the great boast of Cunningham, (the northern district of Ayrshire,) from time immemorial, the inhabitants could not fail to discover that some of their cows yielded more milk than others. When one excelled in milking, they would look well for others of the *same shape* and aspect, and *reject* those that were different. They would naturally rear the calves of the best milkers, in hopes of their inheriting the qualities of their dams. This, and better feeding, would improve their stock, and their success would stimulate them to make still greater exertions to render their cattle better and more productive. Such improvements once began, on sound principles, could not fail to lead to the most beneficial results. To procure more milk, they select

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the cows that they find to be most productive of that fluid, and greatly better her condition. By these means the stock is improved, and by experience and observation, the farmers acquire more correct notions of the breed, and in what manner they can be rendered still more productive. It has been greatly more by these means, than by importing a foreign breed, that the dairy stock of Ayrshire have attained their present unrivalled celebrity; and the farmers having become familiar with the pliancy of the animal, and the proper means of improving and rendering it productive, they will no doubt persevere in making still greater improvements.

"The shapes most approved in the dairy breed, are as follows: *Head* small, but rather long and narrow at the muzzle; the *eye* small, but quick and lively; the *horns* small, clear, bended, and their roots at considerable distance from each other; *neck* long and slender, tapering towards the head, with little loose skin hanging below; *shoulders* thin; *fore-quarters* light and thin; *hind-quarters* large and capacious; *back* straight, broad behind, and joints of the chine rather loose and open; *carcase* deep, and the *pelvis* capacious, and wide over the hips, with fleshy buttocks; *tail* long and small; *legs* small and short, with firm joints; *udder* capacious, broad and square, stretching forward, and neither fleshy, low hung nor loose; the *milk* veins large and prominent; *teats* short, pointing outwards, and at considerable distance from each other; *skin* thin and loose; *hair* soft and wooly; the *head*, *bones*, *horns*, and *all parts* of *least value*, small, and the general figure compact and well proportioned." (*Farmers' Mag. and Mr. Aiton.*)

The *qualities* of a dairy cow are of still greater importance than her shape. Firmness and docility of temper greatly enhance the value of a milch cow; one that is quiet and contented feeds at her ease, does not break over fences, or injure other cattle, so much as those that are of a turbulent cast. To render them docile, they ought to be gently treated, frequently handled when young, and never hunted with dogs, beat or frightened. A moderate degree of hardiness, life and spirits, with a sound constitution, are desirable qualities in a dairy stock, and all these are found in the Ayrshire. Some have mentioned it as a valuable quality, when a cow subsists on a small portion of food; but that will depend on the quantity of milk which one so fed will yield. If any cow gives much milk on little food, it is one of the best qualities she can possess; but of this I entertain doubts, which forty years experience, inquiry and observation, have served to corroborate and confirm. I have heard it asserted, that some cows will yield as much milk, and fatten as fast, when fed on coarse, as others will on rich food; but

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I never met with, nor do I ever expect to see such cows. The old adage so common in Ayrshire, that "a cow gives her milk by the mou," has always held good, so far as I could perceive. It is of the greatest importance for dairy cows to be fed, from their earliest days, on food that has a tendency to produce the milky secretion, and even to be fed on that description of food when they are not giving milk. It was common in former times to rear young cows for the dairy, on moors and heathy ground, and only to lay them on better pastures and dairy food when they came into milk; but this has been found to be an improper mode of rearing a dairy stock, and they now fare much better in their youth than they did in former times. When young cows of the dairy breed are reared on moors, or bad pasture, and get only as much fodder as keeps them alive, they grow up, what in Ayrshire is termed "*a rough beast*," with large horns, coarse hair, thick skin, high bones, and other marks of a starveling, and they *never after become good milkers*. But when they are fed on better pasture, and provided with some green food, and good fodder during the winter, they grow up proper dairy cows, having the shapes and good qualities that have been enumerated. In former times, no other attention was paid to the dairy stock during the winter but to keep them alive. They were fed on the worst and coarsest of oat straw, or ill-preserved bog hay, cut from the marsh meadows, and frequently half rotted in drying. The consequences were, that the dairy cows went out to the grass in May, mere ghosts, lean, weak and meagre, with their milk vessels dried up. Hence the summer was far advanced before the cows either gave much milk, or that which was of good quality. A lean, starved cow, never gives so much, or so good milk, as one that is in proper habit of body. (How true a description is the above, of too many dairies in the State of New-York, and how many have yet to learn that no other animals give a better return for kind care and good keeping, winter and summer, than the dairy cow. Attention to the cows winter and summer as they should be cared for, would add alone to every dairy in the State, where neglect has heretofore prevailed, at least fifty per cent. more butter or cheese than the amount now realized.)

"Some think it is needless to give cows milky food when they are not in milk. I met, some years ago, with a clergyman attending the funeral of one of his parishioners, mounted on a large, meagre, lean horse, and laboring hard with *staff* and *spur*, to keep up with the procession. On a relative of the deceased urging him to accompany the funeral to the grave, he said he meant to have done so, but found his horse could not travel, which was surprising, as he had

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given him *three measures of grain that morning.* Some person expressed a doubt that the horse had not gotten so much every day. The clergyman said he had no grain since last time he rode, *about three weeks before.*" Too many farmers treat their dairy cows on the same principle as this worthy divine did his horse—give them no milky food when *yell.** But those who do so, will find their cows as incapable of giving good milk, after they calve, as the clergyman's horse was to travel, even when he had got *three measures of grain that morning.*

Even young cows intended for the dairy ought to be fed from the time they are calves, on food suitable for milch cows, and treated nearly as their dams. Such food and treatment, have the greatest tendency to form the milk vessels of the young cows, and rear them with dairy qualities, and when they come into milk after being so formed, they will produce the most copious secretion of the milky fluid. It is by such treatment, that a calf is formed into a dairy cow, and those who wish to rear and keep a dairy breed in anything like perfection, must provide them with abundance of such food as is suited to the production of milk; and they must supply them with such food at all periods of their existence; when they are young; when they are full grown; when they are in milk; and when they are in *yell.*"

The suggestions of Mr. Aiton as to the management of dairy cows are worthy of attention, showing as they do, that a first rate uniform dairy stock may be secured, if care and attention is given to the selection of animals from which to breed. Bakewell obtained an improved breed of cattle and of sheep entirely superior to either of those from which he bred, by pursuing a systematic course. In what manner has the short horn breed of cattle been brought to their present state of perfection? especially as regards their early maturity for beef? The attention which has been given in the selection of animals from which to breed, possessed of the desired qualities, has brought about the result sought for in this breed, and while like care is continued the same qualities will be perpetuated. Mr. Colman, in his tour says: "The great law that like produces like, though it is not invariable, is comparatively of universal operation. Good qualities are propogated by the union of animals possessing good qualities; and defects, and faults, and infirmities, are in like manner extended and aggravated." The perfecting a breed of dairy cows in this country we are aware must be a work of time, and requiring much judgment and skill; but that is no sufficient reason why it should not be done. The end to be secured, is one of sufficient importance to justify no inconsiderable outlay, and no small amount of time and labor.

**Yell.* This term is used in Scotland for cows that are not in milk.

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Until this is done, the yield of our dairies will continue far less than they should be, and consequently a dimunition in profit, much more than is desirable for a farmer to sustain. Mr. Moses Eames, president of Jefferson county Agricultural Society in speaking on this subject, the improvement of dairy cows, says, "We should deem it an easy matter to add twenty-five per cent to the dairies of this county, clear of all expenditure of time and money, by improving the quality of the cows. It is believed there is no dairy in the county, consisting of ten cows or more, which does not show a difference of one third in the yield of milk from the best to the poorest cow in the yard, yet the same amount of food is consumed by the poorest as by the best." (Report Jeff. Co.)

Mr. A. L. Fish, of Herkimer county, a dairyman of much experience and observation, says: "A low estimate made from the census taken in 1845, gave the value of the milk product of this State at that time to be forty millions of dollars. The census to be taken in 1850 will, doubtless, show an increase to fifty millions. If suitable care was taken with the feeding and housing the milch cows throughout the State, it would no doubt increase the amount ten per cent.; and much more might be soon added, if proper attention was given to the heifers designed for milkers. I am fully convinced, that a proper adaptation of food, with thorough and continued milking, would much improve the milking habits of the cow. It connot be doubted, I think, that a judicious course in the selection of heifers, and feeding and training them as milkers, will do much towards establishing milking habits, and the object is well worthy the attention of breeders, and a liberal premium for the most successful experiment in this direction, would be worthy of the Society, and would, I should hope, lead to the successful accomplishment of the object."

There is another subject connected with the dairy interest, to which it seems desirable to direct the attention of those engaged in this branch of husbandry. It is well understood by all good farmers, that continued cultivation and cropping of land, will soon diminish its fertilizing qualities, rendering necessary a judicious application of manures, to restore the exhaustion caused by the crops grown. It has appeared to us, that probably our grazing lands, which are solely devoted to that object, will ere long begin to give indications of a failure to supply that kind of nutriment which is best adapted to the healthfulness of the cow, and to the secretions calculated to furnish the requisite quality of milk. The phosphates, so important and necessary for the milch cow, and which are carried off so largely from the pastures, in the milk, will need to be returned. This has been the case in Cheshire in England, which has

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been a dairy region from the earliest period of English history, and bones and bone dust have been long used there as indispensably necessary to restore the waste made by the animals fed upon the pastures. The following extract, from an article in the Edinburgh Review, in relation to Cheshire, shows more particularly the result:

"Dairy husbandry has long prevailed in Cheshire. Now it has been ascertained that every milk cow robs the land annually of as much phosphate of lime as is present in eighty-two pounds of bone dust. From being thus gradually despoiled of this valuable mineral, the Cheshire pastures have become less rich in nutritious herbage; and hence the peculiar benefit derived from boning them, a practice now so extensively and profitably introduced."

Dickson, in his work on Agriculture, published fifty years since, remarks "That the manuring of pasture lands is much less in practice than ought to be the case, as where the soil is not good, and it is kept in a constant state of feeding or pasturage, it would seem probable that the fertility must in some measure decline, if proper means be not taken to preserve and keep it up, even though they should be fed down with sheep, which is unquestionably in this view the most favorable sort of stock. It is indeed hardly to be supposed that the small proportion of excrementitious matter that is dropped at random during the feeding of the animals, especially the larger kinds, under an exposure to the dissipating and wasting effects of the atmosphere at different seasons, where no other sort of food than that of the natural grasses of the pastures is consumed, can in such sorts of land be adequate to the restoration of the great degree of fertility that is constantly conveyed away in the time of pasturing. In the better kinds of pasture lands, where the produce of the grass is considerable, improvement may, and undoubtedly does, take place by feeding them, especially by sheep, as the discharge of the animals are not only more abundant, but a proportion of old grass is left to decay during the winter season, and in that way makes an annual addition to their fertility. It appears probable to us, however it may differ from opinions that have been held on this subject by some cultivators, from much close attention to the management of grass lands of the less rich kinds, in state of pasture, that in such cases, unless attention be paid to improve their condition by some other means than merely that of the manure dispersed over the land by the animals in simply consuming the herbage, that they must in time become gradually deteriorated, and the quantity of pasture be lessened so as to support smaller proportions of stock than was formerly the case. This supposition seems indeed, in some degree, supported by the con-

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dition of downs, and other uninclosed lands thathave been in a state of pasturage for a great length of time; as in these cases if feeding had rendered them more fertile, they must long since have been enabled to carry a vastly increased proportion of stock, which is certainly not the case. That feeding down lands in a judicious manner, has the effect of rendering the herbage more fine, and better for the support of stock in general, there cannot be the smallest doubt; but it does not certainly follow that the fertility of the land in such cases as has been just mentioned, is thereby really improved, as has been supposed by some employed in grazing. It seems not improbable, but that the bettering of the condition of the herbage by feeding the lands with sheep may have occasionally led to the supposition that the fertility of the grounds was thereby, in *all* cases, really improved. Though immediate improvement of the fertility of pasture grounds may be effected in different ways, as either by the direct application of manure in its natural state, such as that of rotten dung, lime, marl, or in that of earthy compost, occasionally over their surfaces in a thin even manner; or indirectly by the folding or confining of sheep upon the land during the time they consume other sorts of green food. The latter mode is unquestionably the most advantageous and convenient, as it is in but very few situations that the former can be practiced without injury to the arable or hay lands. By proper attention in this way, the more poor pasture grounds might soon, and at little expense, be brought into a good state of pasturage."

Prof. JOHNSTON, in the 2d edition of his lectures, page 1067, in relation to the manure from the droppings of the milch cow, says: "The *milk cow* exhausts still farther the food it eats. In the lean milk cow, which has little muscle or fat to waste away, and therefore little to repair, the sustaining food is reduced to the smallest possible quantity. This small portion of food is all that is returned to the husbandman in her dung. The phosphates, salts and gluten, and even the starch of the remainder of the food she eats, are transformed in her system, and appear again in the form of milk. The dung of the milk cow must be very much poorer and less valuable, compared with the food she eats, than any kind of stock."

"It is true, the bulk of her dung may not be very much less than that of a full grown animal, which is yielding no milk; but this bulk is made up chiefly of the indigestible, woody fibre, and other comparatively useless substances which her bulky food contains. The ingredients of the milk have been separated from these other substances as the food passed through her body, and hence, though bulky, the dung o

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the milk cow is colder and less to be esteemed than that of the dry cow or of the full grown ox."

It will be obvious, from the above remarks, that the droppings of the cow, inferior in quality as a manure, cannot for a great length of time answer the purpose of keeping the land in the proper condition, and that a resort eventually must be made to other manures to restore the substances exhausted. Natural pastures have peculiar grasses, which give a succession of rich and succulent herbage during the season. In case of artificial pastures, this seldom or never occurs. Sir George Sinclair states, 'that the different grasses of the richest natural pastures in England are 26 in number,' and 'that from the spring to the end of autumn, there is not a month that does not constitute the particular season of luxuriance of one or more of these grasses.' Whether the varieties of grasses in our natural pasture lands are as numerous as in England, we are not informed; but we have often heard from dairymen that no pasturage gives as sweet butter as the natural pastures, and, so far as we have experience, we believe this is true. If this is so, then the importance of so managing the lands as to keep up these pastures, and prevent the necessity of a course of grain crops to restore fertility, must be obvious. Professor Johnston, in his lectures, ante page 253, says: 'Dairy husbandry produces a special exhaustion of the soil; and knowing this, and what substances have been taken out of the soil, and carried off in the shape of milk, we know what to be put in to reclaim it.' "

We desire to call the attention of dairymen to this matter, and trust that they will communicate the results of their own experience and observation, and give such suggestions as may be important, in relation to the subject.

BUTTER DAIRIES.

There were submitted for premiums two applications—one from Horace Clapp, of Houseville, Lewis county; the other from John Holbert, Chemung. Mr. Holbert's dairy is well known, the first premium of the Society having been heretofore awarded to it, and its high character is still maintained. The management of his dairy is fully described in Transactions, 1848, page 269. During the past season he has had 38 cows; has made 5,403 lbs. of butter, averaging 142 lbs. per cow. Sold pork, fattened on buttermilk and corn, 4,142 lbs.; reserved for family use, 1,200 lbs. Butter sold in New-York for 22 cts. per lb. The season in Chemung has been unusually dry, and Mr. Holbert's pastures have been seriously affected by the drought.

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STATEMENT OF HORACE CLAPP.

Farm located in Turin, Lewis county. Three-fourths of it upland. Latitude, 43½. Farm contains 200 acres under cultivation, 125 acres in pasture, 50 acres in meadow. Soil, loam. White clover for pasture; timothy for hay. My meadows are top dressed, in the fall, with muck, (or common earth,) mixed with manure of equal parts, thirty loads to the acre. Average of hay, from 1½ to 2 tons per acre.

Commence making butter 15th April, close 15th December. Average quantity of milk per cow during the season 12 lbs. per day, from whole herd, 480 lbs; 5¼ lbs. of butter to 100 lbs. of milk. Quantity of milk during the season from the whole herd 115,200 lbs. Average quantity of butter per cow for the last ten years from 165 to 180 lbs; quantity the last season, 6,800 lbs. Rear no calves; generally keep swine, one to four cows. No feed, (usually,) except grass and hay.

Treatment of milk and cream.—Milk strained into pans, stands from 30 to 48 hours, (as the weather may require.) Cream put into a tin cooler, made expressly for the purpose; kept cool and sweet with ice. Churn every day.

Mode of churning.—Use two churns, each containing 90 gallons; part of the season I churn a good share of the milk by water power; the churn used for cream is one of my own invention, has a tin inside, with a space of four inches between the tin and wood, to receive water and ice while churning. Temperature 50°; churn from 50 to 100 lbs.

Mode of making butter.—It is taken from the churn with a ladle and put into a wooden machine or brake to extract the milk from the butter *without washing*, salted and placed upon ice for 12 hours, then worked the 2d time, and packed in the tub. Use a refrigerator to keep the ice and butter before packing in the tub, and to keep the butter *clean*. (Great care should be taken so that the butter is not overworked so as to injure the grain.) Use Bonaire ground salt, 5 to 6 lbs. to 100 lbs. of butter. No other substance used. The butter from the dairy has been sold in Boston for the last ten years at 23 cents per lb. Milk room 30 by 24, in basement, three sides underground with free circulation of air. Milk set upon stone.

No of cows, 40; breed from ¼ to ¾ Durham cross with native. Cows calve from 1st to 15th April. The difference in the milk of different cows in the extreme is ¼ average ¼ between those giving the best milk and those inferior. White clover pasture produces the most and best milk. Cows feed in one pasture, which is deemed preferable to change of pasture, with a full supply of running water, and free access to salt, kept in a close trough at all times. It requires from 3¼ to 4 acres of land to keep a cow *in good condition* through the year.

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Remarks.—The principal causes of poor butter is attributed to the following errors, viz.: 1st, For want of a proper place, cool and airy, to keep the milk. 2d, Want of neatness throughout the entire dairy. 3d, Want of strict attention. 4th, Suffering milk to stand too long before it is skimmed. 5th, Cream not kept sufficiently cool, and standing too long before it is churned, consequently the butter becomes soft, sour and worthless, and unfit for use by any who like good butter.

HORACE CLAPP.

Affirmed before me, by Horace Clapp, that the facts set forth in the foregoing statements are true to the best of his knowledge.

NATHAN NICHOLS, *Justice of the Peace.*

The committee award the first premium of a Silver pitcher of the value of $50 to Horace Clapp, Houseville, Lewis co. The second, a Silver cup of the value of $30 to John Holbert, Chemung, Chemung co.

BUTTER AND CHEESE.

Committee.—Henry Wager, Oneida; P. Barber, Cortland; Samuel Cary, Albany.

The committee report, that a large number of samples of butter were offered in competition, and that some of these were of most superior excellence, and as good as any ever presented to the society, and that in the opinion of the committee they could not in justice award a premium to one in preference to another. The quality of the butter being of such excellence, it is recommended that a first premium be awarded to each of the competitors, (Silver cup of the value of $15;) Horace Clapp, of Lewis co.; Joseph Cary, of Albany; John Holbert, of Chemung, and Hector C. Tuthill, of Cayuga.

The second premium, a Silver cup of the value of $10, is awarded to Noah Hitchcock, Jr., of Homer, Cortland county.

Several of the other samples exhibited were of good quality and reflect much credit on the manufacturers.

But one sample of cheese was exhibited, and the committee did not consider it of such excellence as to justify them in awarding a premium.

Statements of the method of making the butter of Mr. Clapp, Mr. Holbert and Mr. Hitchcock, will be found under the report of the committee on Butter, ante page 103.

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WHEAT.

[EXPERIMENTS WITH WHEAT—THICK AND THIN SOWING.

The paper presented by Mr. Adam Clark, of Yates county, contains a set of experiments on the sowing of wheat, which seems to the committee most opportune, inasmuch as the question of *thick* or *thin* sowing of grain is agitated strongly at this time, not only in this country but in England. The experiments of Mr. Clark show that wheat planted uniformly at distances of 1½ inches apart will require about 224¼ lbs. or 3 bushels 44¼ lbs. per acre. This weight of wheat consists of about 2,890,320 grains. Mr. Clark planted a portion of ground in this manner, which was harvested at the proper season and thrashed on the 22d of August, and weighed on the 17th of December—estimating every ounce to contain 800 grains, as weighed by him. The product of an acre similarly treated produces 63,248,000 grains, or 4160 lbs., which is equal to 69 bushels 10 lbs. of wheat per acre.

The second experiment shows that about *two bushels* of wheat or 126 pounds, sowed on an acre of ground at the uniform distance of *two* inches apart, will yield 3580 lbs. of wheat, or 59 bushels 40 lbs. per acre. In this experiment the number of grains sowed to an acre is about 1,616,000.

It has been usually estimated that in broad cast sowing of wheat under favorable circumstances as to weather and condition of the soil, the average deposit of seed is 48 grains per square foot, if so, an acre of broad cast requires 2,090,880 grains; and estimating this quantity at the weight of Mr. Clark's wheat, it gives 2 bushels and 44 pounds per acre. It would have been advisable to measure and weigh the seed *before* planting, as well as after harvest, as season and cultivation may essentially vary the relative quantity and quality of the seed and the product. We would have been pleased to know also whether every seed planted, arrived at maturity; if not, what proportion was imperfect or destroyed. It is well known that a large per centage of the wheat sown broad cast is lost to the farmer. We need therefore very exact observation, to approximate a fair estimate of comparisons. We hope Mr. Clark will continue this class of investigation, it is important and valuable. It is not from any isolated experiment we can venture to draw a final conclusion, and on this account we would urge Mr. Clark to continue his experiments, until repeated similar results may justify a general rule.

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The committee respectfully recommend that a volume of the Transactions of the Society be presented to Mr. Clark, for his interesting communication.

J. DELAFIELD, *Chairman.*

West Dresden, Yates Co., Dec. 20, 1849.

B. P. JOHNSON, Esq., Sec'y, &c.—It is with great pleasure that I undertake to redeem my promise to furnish the result of an experiment in raising wheat. On 23d September, 1848, I prepared four beds of ground to plant with wheat, on a summer fallow that had been twice plowed during the summer. The ground was prepared by finely pulverising it with a hoe and rake, to the depth of eight inches. Four beds were accurately measured, each one-fourth of a rod square, leaving a walk of about 7 inches between them; they were numbered and subdivided as follows: No. 1 in squares 1¼ inches each way; No. 2, about two inches; No. 3, a little short of three inches; No. 4, 3¼ inches, including the outside lines of each bed. Then with the thumb and finger I carefully dropped a kernel of wheat in the corner of each small square, of No. 1 and 2, then with a stick prepared for the purpose, I placed each grain 1¼ inches below the surface, and then with the head of a rake made the surface entirely smooth. On Monday 25th I planted Nos. 3 and 4 in the same manner; they were all planted with the Soules variety of wheat—the seed dry, without any preparation. The soil is a clay loam with a slight inclination to the north and north-west, and fully exposed to the winds from those directions. I used no fertilizers, except a little Gypsum; on 17th of May while sowing on the rest of the field, I gave the bed a slight coating at the rate of from 1½ to 2 bushels per acre. Harvested July 25th 1849, with a hand cradle, and bound it into sheaves and carried it into the barn in about two weeks. The parcels carefully shelled and kept separate. On the 22d August, each parcel was weighed separately, by sealed scales, the result of which may be found in the annexed table. On the 17th of Dec., 3 oz. were weighed in sealed scales, and by counting all the grains weighed, I found that there were 800 grains in an ounce. An estimate of the amount of seed planted is made from this data, as well as the average product from each.

	No. 1.	No. 2.	No. 3.	No. 4.
No. of grains planted.....	4,488	2,525	1,206	870
Weight of product in lbs & oz,	6 lbs. 8 oz.	5 lbs. 9½ oz.	4 lbs. 12 oz.	4 lbs. 4 oz.
Amount of seed sown per acre,	3 bu. 45 lbs.	2 bu. 6 lbs.	1 bu.	43¾ lbs.
Yield per acre in bushels,....	69 bu. 20 lbs.	59 bu. 40 lbs.	50 bu. 40 lbs.	45 bu. 20 lbs.

Average yield per acre, 56 bu. 15 lbs.

ADAM CLARKE.

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WHEAT AND RYE.

Committee, Hon A. J. Upham, J. B. Burnet, Nelson Van Ness.

The committee report, That but one application has been presented for winter wheat, by Adam Clark, of West Dresden, Yates co., and though the conditions required have not been fully complied with, yet as the statements furnished are interesting and valuable, the committee are of the opinion that Mr. Clarke is deserving of a special premium of ten dollars.

There were two applicants for the premium on spring wheat, George K. Eells, of Clinton, and H. B. Bartlett, of Paris, Oneida co. The first premium, $15, is awarded to G. K. Eells, 37 bu. 39 1-2 lbs. per acre; and the second, $10, to H. B. Bartlett, 31 bu. 13 1-2 lbs.

J. J. Thomas, experiments as to the proper time for cutting wheat, $5.00.

RYE.

Two applications only were made, one of which did not present the quantity required by the rules of the Society. The first premium of $15, is awarded to David Conrad, Brunswick, Rensselaer co., 36 bu. 04 lbs. per acre; quantity of land 5 acres 28-100. It will be seen in Mr. Conrad's statement, that he sowed two varieties, the common winter rye, and the multicole. The yield of the latter over the former, was, as 23 bush. 15 lbs. to 17 bush. 29 lbs., per bushel sowing.

WINTER WHEAT—STATEMENT OF ADAM CLARK.

Mr. B. P. Johnson,—Sir, your letter of the 22d of Dec. was not received until the first of January, in which you state that my crop of wheat would be received in competition. But on account of the depth of snow that has fallen, I am unable to get the land surveyed, and consequently cannot comply with the requisition of the State Society. But I will present the following account as a sample of the way in which I keep the account of debtor and creditor in my farm management, with every field. The following account is taken from my farm book in account with field No. 10:

WHEAT.

			Dr.
		No. 10. *Five acres and sixty rods.*	
1848.			
July	4.	To 3 1-2 days plowing, at 16s,.....	$7 00
Aug.	25.	To 3-4 day with cultivator, ...	1 50
Sept.	10.	To 2 1-2 days' cross plowing,.....	5 00
	21.	To 11 bushels seed, (and sowing,) at 9s. per bushel,	13 00
		To 2 days with cultivator and harrow,.....	4 00

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1849.		
May	To 6 bushels plaster and sowing,.....	1 13
July 21.	To 2 3-4 days' cradling, 12s., 5 do raking and binding, 10s.,.....	10 38
26.	To 1 1-4 days' hauling in, two hands and team, ...	4 00
Oct. 13.	To 4 hands one day thrashing, besides hands with machine,.....	4 50
	To 4 horses one day, 16s., keeping 4 more do. 8s.,..	3 00
Nov. 7.	To 1 1-2 days' hauling and marketing, 3 hands and team, ...	5 00
	To paid machine, 4c. per bushel, ...	9 32
	To year's interest on land, at $40,.....	15 05
	To whole amount of expenses,.....	$82 88
	Cost per acre, ...	$15 32

1849.		Cr.
Oct. 13.	By 233 1-3 bushels of wheat, at 8s. 6d. per bushel,	$248 03
	By 14 loads of straw, at 4s.,.....	7 00
	Whole amount,.....	$255 03
	Deduct amount of expenses,.....	82 88
	Clear gain of,.....	$172 15
	Clear gain per acre,.....	$32 12
	Whole cost per bushel delivered at the Hopetown mills, ...	32
	Yield per acre, 43 1-3 bushels.	

Soil, clay loam; manure, none; seed, Soule's variety; quantity seed, a little over 2 bushels per acre; time of sowing, 21st September, 1848; time of harvesting, July 21st, 1849. The amount given as the same weighed in at the Hopetown mills; the land measured with four rod measuring tape; the samples of No's 2 or 3 of the experiments presented to you, will be about a fair sample of the crop.

The crop was sold at 8s. 6d. Some of my neighbors sold at 9s. 6d., which would raise the gain per acre to $37.89, and you will perceive that I have charged for the above work by the day instead of by the month.

ADAM CLARKE.

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Spring Wheat.

Statement of the method of cultivation of crop of spring wheat, by George K. Eells, of Clinton, Oneida County.

The previous crop was corn, planted upon the inverted sod of an old pasture, without any manure excepting two loads in the hills of a few rows. Corn was planted about the 20th of May; product about sixty bushels per acre.

The farm is located two miles west of Clinton village, on an elevation inclining to the east. The soil is composed of clay, loam and gravel, in good condition. No manure used on the present crop excepting four loads of long manure, plowed in on one corner. Plowed the land in April, eight to ten inches deep, and on the 1st of May sowed broadcast four bushels of the Siberian spring wheat on the piece, previously prepared by soaking in strong brine, and adding as much lime as would adhere to the wheat while wet, and dragged it in both ways. Harvested the crop about the middle of August; thrashed a part of it in September, and the remainder in December.

The yield was 4,519 lbs. of wheat, equal to 75 19-60 bushels, being 37 bushels and 39 lbs. per acre, my entire crop being measured.

The expense of cultivation is as follows:

	Dr.
To plowing 1 1-2 days, at $2,.....	$3 00
To 4 bushels of seed, at 10s.,.....	5 00
To harrowing one day, ...	2 00
To harvesting five days, 8s., ...	5 00
To 4 loads manure, 4s.,.....	2 00
To thrashing, at 10 cents per bushel,.....	7 54
To interest on land at $50 per acre,.....	8 68
	$33 22

	Cr.
By 75 19-60 bushels wheat at 10s, (reserved for seed,).....	$94 15
By straw, ...	7 50
	$101 65
Expenses, ...	33 22
By profit,.....	$68 43

Clinton, Jan. 4th, 1850. GEORGE K. EELLS.

(The proofs given as required by the rules of the Society.)

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H. B. BARTLETT, PARIS, ONEIDA CO.

Statement and method of the cultivation of two acres of Italian spring wheat, raised on the farm of H. B. Bartlett. Soil gravel and sand loam, in good condition. It was a pasture broken up last year and planted to corn. The corn was topped, and the stalks left on the ground. Plowed last spring about seven inches deep, and harrowed twice. Sowed four bushels of Italian spring wheat, about the first of May, broadcast. Cut it with sickles the 13th and 14th of August. Thrashed the middle of October with machine, producing 62 bush. 27-60 of superior wheat, valued at 10s per bushel, being 31.31½-60 bushels per acre.

Cr.

By wheat,.....	$77 50
By straw, 8s.,.....	1 00
	$78 50

Dr.

Expense of cultivation and use of land, ...	22 00
Profit, ...	$56 50

H. B. BARTLETT.

(Proofs as required by the rules of the Society.)

J. J. THOMAS, MACEDON, WAYNE CO.

Result of experiments in cutting wheat, at different periods, for one month.

July 29th.—Heads just appeared, perfectly green, juice quite liquid, 100 seeds weighed 20 grains.

August 4th.—Heads with a faint shade of yellow; 100 seeds weighed 35 grains.

August 11th.—Heads about 1-3 changed to yellow seeds in "the dough;" 100 seeds weighed 46 grains.

August 15th.—Heads mostly yellow, a few streaks of green in the chaff, heads erect; 100 seeds weighed 55 grains.

August 29th—Heads dead ripe, and curved down; 100 seeds weighed 53 grains.

(It will be seen from the above interesting and valuable experiment made by Mr. Thomas, that the grain cut on the 15th of August, when the heads were mostly yellow and erect, weighed two grains to the 100 seeds, more than that dead ripe, and far exceeded those cut at an earlier period.

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We are greatly indebted to Mr. Thomas for this experiment. It is laboring in the right direction, and if continued and persevered in, we shall arrive at reliable conclusions as to the stage of growth, at which it will be most advantageous to the farmer to gather his crops. This experiment, and the one by Mr. Clark, of Yates co., as to the quantity of seed to be sown, we rejoice to present before our farmers, and trust they will stimulate them to be equally observing, and report their experiments and results to the State Society, to be spread before the farmers of our entire Union.)

David Coonrad.

Rye Crop.

The field for four or five previous years was pasture; no manure was used. The soil is a gravel and loam, and when seeded (some five years previous,) was new land. The farm is situated in the town of Brunswick, in the county of Rensselaer, and about four miles east of Troy.

There has never to my knowledge been any manure applied to said field, except in the pasturage of the same, neither lime or plaster was used. I sowed ten bushels of seed rye, eight bush. of the common, and two bush. of the *multicole variety. Sown alike as to thickness, and same quality of land.

Sown 10th September, 1848; harvested about the last of July, 1849. Thrashed and cleaned between January 1st, and 12th, 1850. Sown and harvested in the ordinary method.

The two bushels sowing yielded by measure,.....	46 30-32 bush.
The eight bushels sowing yielded by measure,.....	143 12-32 "
Total, ...	190 10-32 "

The crop not yet marketed, but worth in Troy, 56 cents per bushel.

190 10-32 bushels, at 56 cents, ...	$106 57
2,000 bundles straw, at 1 cent, ...	20 00
	$126 57

Six days plowing,.....	$12 00
Harrowing, one day, ...	1 50
Four days cross-plowing, (immediately before sowing,).....	8 00
Two days dragging,.....	3 00

* The multicole variety yields, compared with the common variety, as 23 15-32 to 17 29-32 bush. per bushel sowing.

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Sowing,	50
Harvesting and drawing, 16 days,	16 00
Thrashing and cleaning,	5 50
Two bushels seed, at 10s. 8 bushels, at 5s.,	7 50
	$54 00
Nett profit,	72 57
If interest of land be taken out, at $80 per acre,	29 56
Leaves,	$43 01

Quantity of land, 5.28-32 acres; yield per acre, 36 4-100 bush., or, $8.14 per acre.

In the fall 22 head of sheep fed upon the acre, for about 5 weeks. (Proofs as required by the rules of Society.)

INDIAN CORN.

Committee—T. C. Peters, R. G. Pardee, O. C. Chamberlin.

There were but two competitors who came within the rules of the society, as to the quantity of land (two acres) cultivated. Each of the competitors has grown a crop sufficiently large to be entitled to a premium. The committee therefore recommend that the first premium of $20 be awarded to Mr. E. R. Dix, of Vernon, Oneida co., he showing to their satisfaction that he raised 83 bushels and 4 quarts of shelled corn per acre. They also award the second premium to Mr. Peter Crispell, Jr., of Hurley, Ulster co., he having exhibited satisfactory evidence of having complied with the rules of the Society. Mr. Crispell raised 80 bushels and 15 quarts of shelled corn per acre. The expense of manuring the crop in the latter case was much larger than in the other. The committee recommend that both statements be printed in the Transactions. There were exhibited some very choice samples of corn by Mr. Charles W. Eells, of Kirkland, Oneida co., Augustus Flint, of Dutchess co., and Wm. Baker, of Lima, Livingston co. As there are no premiums for corn as to quality alone, the committee can only commend those specimens to the favorable notice of the Society.

STATEMENTS.

ONEIDA COUNTY, *ss.*

Eli R. Dix being duly sworn, says, that he raised a crop of corn the past season upon the land surveyed by Norton G. Merrel, and that the quantity of grain raised thereon was one hundred and sixty-six bushels and eight quarts, measured in a sealed half bushel; and that he was

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assisted in harvesting and measuring said crop by Francis Carpenter; and that the statement annexed, subscribed by this deponent, as to the manner of cultivation, expenses, &c., is in all respects true, to the best of his knowledge and belief; and that the sample of grain exhibited is a fair average sample of the whole crop.

ELI R. DIX.

Sworn to before me this 31st day of December, 1849.

LEVI T. MARSHALL, *Justice of the Peace.*

ONEIDA COUNTY, *ss.*

Francis Carpenter, being duly sworn, says, that he assisted Eli R. Dix in harvesting, getting out, and measuring his crop of corn referred to in the above affidavit; that the quantity of grain was one hundred and sixty-six bushels and eight quarts, as stated in the affidavit of E. R. Dix.

FRANCIS CARPENTER.

Sworn to before me this 31st day of December, 1849.

LEVI T. MARSHALL, *Justice of the Peace.*

Statement of the cultivation, &c., of a crop of Indian Corn, raised by E. R. Dix, of Vernon, Oneida county.

The land the present year, upon which the following crop of corn grew, is supposed to be about 150 feet below the summit level of the Chenango canal. The soil, a gravelly upland loam, in the immediate vicinity of large quantities of lime stone. The two previous crops meadow grass, and not manured, or the present one. Plowed once in April, to the depth of about 10 inches. The cultivator passed over both ways, and marked with marking rake 3 and ½ feet each way. Planted about the 11th of May, averaging about six kernels to the hill. Cultivated with steel tooth cultivator twice each way; the hoe passed through the first time and about one-third the second, making two days hoeing. From our present manner of using the cultivator, I consider hoeing almost useless, except in setting up and weeding the hill the first time. Harvested in Oct.; thrashed the 26th and 27th days of December, and marketed at Vernon Center Mills, for 50 cts. per bushel.

Expenses of Cultivation.

Two days's plowing,.....	$4 00
Two days cultivating and marking,.....	3 00
One and half days planting,.....	1 13

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Two days cultivating,	2 00
Two days hoeing,	1 50
Ten days harvesting,	7 50
Thrashing and marketing,	6 00
Seed,	75
Interest on land,	5 60
Expense,	$31 48
166 bushels 8 lbs. of corn, at 50 cts.,	83 13
Stalks,	5 00
	$88 13
Deduct expenses,	31 48
Profit,	$56 65

ONEIDA COUNTY, *ss.*

Norton G. Merrell being duly sworn, says he is a surveyor, that he surveyed with chain and compass, the land upon which Eli R. Dix of Vernon raised a crop of Indian corn the past season, and the quantity of land, is two acres and no more.

NORTON G. MERRELL, *Surveyor.*

Sworn to before me, this 27th day of Dec. 1849.

L. T. M., *J. P.*

CORN.—PETER CRISPELL JR., HURLEY, ULSTER, COUNTY.

We omit the affidavits in this case, of the surveyor, Mr. Crispell and the person who assisted in harvesting, getting out and measuring the corn when shelled; they are similar to those in the case of Mr. Dix, and as required by the rules of the Society. We give the manner of cultivation.

Mr. Crispell's Statement.—The soil on which my corn was raised is alluvial, was rye stubble of last year, which had not been manured within four years. I put on this spring 16 loads of my barn yard manure to the acre before plowing—which was done about the 20th of May, full eight inches deep; it was harrowed twice before furrowing or marking out for planting, it was intended to be marked, so as to have the rows three feet apart; but was somewhat closer having made 93 rows in the distance of four chains, and about as close the other way. It was planted in hills on the 24th day of May. The corn came up, so as to be plainly seen in seven days; corn planted dry, the number direct

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ed to be dropped in the hill was not to exceed five grains. The variety of corn planted was the eight rowed yellow, a variety somewhat larger than that which I usually plant. About ½ bushel of seed was planted. Shortly after planting, 100 bushels of leached ashes were thrown over (per acre) with shovel, not putting on the hills, but spread over the whole soil. The corn was cleaned out with the cultivator, (as soon as it was large enough to be seen, through the rows) by going through both ways. It was then plowed both ways and hoed, and when it was sufficiently large, it was again cross cultivated, then cross plowed and hoed, by which time the corn was tasseling out, when only four stalks were left in a hill. The stalks were cut the last week in September, and the corn husked the third week in October. There were five large loads of stalks worth three dollars a load, for fodder. The corn was shelled on the 25th, 26th and 27th days of December, and measured in a sealed half bushel, 160 bushels and 30 lbs.

Expense of Raising Crop.

To one days work plowing,	$2 00
" drawing out manure,	4 75
" harrowing, furrowing and planting,	2 00
" cultivating, plowing and harrowing,	3 75
" cutting up corn,	1 87
" husking and sorting,	4 50
" shelling,	2 25
" value of barn yard manure,	16 00
" " ashes,	22 00
" Interest on value of land,	14 00
	$73 12
Value of corn at this time here is 5*s*.6*d*. per bushel,	$110 65
" stalks,	15 00
	$125 65
Net profit,	$52 53

PETER CRISPELL, Jr.

Dated, Jan. 2d, 1850.

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BARLEY, OATS, BUCKWHEAT AND PEAS.

Committee.—J. W. Ball, Martin Springer.

The number of competitors on barley was four, and the samples presented were of excellent quality, and the yield per acre shows clearly superior skill in the management and cultivation of that crop.

The committee award the premiums as follows: to Elisha M. Bradley, East Bloomfield, the first premium of $15, the amount being 50 1-2 bushels per acre; to E. R. Dix, of Vernon, Oneida co., the second of $10, being 48 bush., 28 qts.; the third to Benjamin Enos, of Madison co., 47 bushels per acre.

Oats.

But two applicants for premiums. To Peter Crispell, Jr., we award the first premium of $15, for 85 bushels 20 lbs. per acre; to Elisha M. Bradley, the second, $10, 75 bushels per acre.

Buckwheat.

But two samples. To Robert Eells, of Westmoreland, Oneida co., the first premium of $10, 33 bus. 22 lbs. per acre; to William Baker, Livingston co., the second, $10, 29 bus. 14 lbs.; being very nice samples.

Peas.

But one sample offered and that by E. S. Salisbury, of Jefferson co. We award to him the first premium, $10; amount per acre 27 1-2 bushels. The committee very much regret that peas and beans are so little noticed by our farming community, when they are in so common use and of such immense value to the farmer. It certainly must be admitted that they are among the most valuable crops raised by the farmer.

Barley.

E. M. BRADLEY, EAST BLOOMFIELD.

The field had lain in meadow some six years previous to 1848, when it was plowed seven inches deep and planted to corn. Soil a sandy gravel intermixed with loam, some ten or twelve inches deep; a clay sub-soil. The field is nearly level, and is unprotected by woods or buildings. Last spring it was manured with about thirty loads of manure to the acre from a sheep hovel; plowed eight inches deep, and sowed the 10th of April, with three bushels of the two rowed variety of barley to the acre. Then roughly harrowed after sowing. No further culture. Ripe and harvested the last of July; cut with a hand cradle, bound up in small sheaves, and set up in open shocks to dry. Thrashed the first of September; well cleaned and measured in a sealed half bushel, and found

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to yield one hundred and one bushels of good merchantable barley, being 50 1-2 bushels per acre. The expenses of the crop were as follows:

Two days plowing and dragging, hand and team,.....	$4 00
Six bushels seed, at 4s,.....	3 00
Sowing,.....	20
Four days work harvesting,.....	4 00
Thrashing, cleaning, measuring and hauling to market,.....	6 00
	$ 17 20
One hundred and one bushels barley, at 4s,.....	$50 50
Straw, three tons, at $2 per ton,.....	6 00
	$56 50
Leaving a balance in favor of the crop, of.....	39 30

Equal to $19.65 per acre.

(Proofs as required by the rules of the Society.)

BARLEY.—E. E. DIX, VERNON, ONEIDA COUNTY.

The land upon which the following crop of barley grew was upon rolling upland. Soil a gravel loam upon an underlayer of limestone rock. The previous crops corn, without manure. The cultivation for the barley crop was simply plowing once about ten inches deep. Seed sown broadcast, five bushels to the acre. The cultivator being passed once each way over the land after being sown. Seed sown the 13th of April. No manure applied. Farm supposed to be located 150 feet below the summit level of the Chenango canal. Crop mowed and raked with horse rake; thrashed with machine, and cleaned with fan mill. Harvested the 4th of August. The yield from two acres was ninety-seven bushels and 22 qts., by measure in a sealed half bushel. Two bushels being weighed, the remainder estimated by same weight, amounting to one hundred bushels twenty-seven pounds. Market value of the crop, fifty cents per bushel.

Expense of Cultivation.

1 1-2 days plowing at 12s,.....	$2 25
1 days' sowing, cultivating and rolling,.....	1 50
1 days' cutting,.....	1 00
Gathering and carting,.....	3 00
Thrashing and cleaning,.....	6 00
Interest on land,.....	5 60
	$19 35

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By 97 bushels 22 lbs. at 4s per bushel,	$48 85
Straw,	5 00
	$53 85
Deduct expenses,	19 35
Profit,	$34 50

Profit per acre, $17.25.

(Proofs as required by the rules of the Society.)

BARLEY—B. ENOS, DE RUYTER, MADISON CO.

Statement of field of barley containing three acres, one rood, and twenty-eight rods of ground. Variety two rowed, and yielded 161 bush. of first rate barley, measured in a sealed half bushel. Soil gravel, loam and sand. Last year planted with corn, and manured with about 120 loads of manure from my barn yards; no manure this year. Second and third of April plowed, and sowed on the twenty-third, ten bushels of the two rowed variety.

Expense of the crop.

Two days plowing, boy and team,	$2 00
Ten bush. of seed at 4s,	5 00
Expense of harrowing, sowing and rolling,	1 50
Harvested on the twenty-eighth of July, expense including carting,	3 00
Interest on land, at $50 per acre,	12 00
Cost of thrashing,	7 00
Total expense,	$31 50

	Cr.
By 161 bush. of barley at 4s,	$80 50
By straw, the best I ever saw, worth at least,	16 50
	$97 00
Deduct expenses,	31 00
Profit,	$66 00

Cost per bush. including interest on land, and thrashing,	19 cents.
" " exclusive of " "	7 45-100
Profits per acre, after all charges are paid,	$19 39

(Proofs as required by the rules of the Society.)

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OATS—PETER CRISPELL, JR., ULSTER CO.

The ground on which my oats were raised was the ground on which corn of last year was raised, for which I obtained the state premium. It was not manured after the corn crop, was plowed at about the usual depth of my plowing, from seven to eight inches deep. My soil alluvial. I sowed four bushels to the acre of our common oats, on the twentieth of April; harvested and thrashed the crop the first week in August. The actual yield by measure, in a sealed half bush, 171 8-32 bush. The market value of the crop at present, is, in this place, about three shillings and sixpence per bush.

The Expense of Cultivation.

To plowing land,.....	$2 00
To sowing and harrowing,.....	1 12
To cutting, gathering, thrashing and cleaning,.....	13 00
	$16 12
Value of oats at present time, ...	74 91
	$58 79

From which might be deducted the interest on the value of land, at $100 per acre.

Dated November 26, 1849.

(Proofs as required by the rules of the Society.)

OATS.—E. M. BRADLEY, EAST BLOOMFIELD.

The field (four acres) had lain to meadow five or six years previous to 1848, when it was manured with about 30 loads of common barnyard manure to the acre; plowed seven inches deep and planted to corn. The soil is gravelly loam, subsoil clay; field not protected by woods or buildings; has a gentle slope to the north and west; no manure was applied the last season; three bushels of seed (common black and white variety) were sown to the acre. Field plowed once, eight inches deep, and sown the 15th of April; no further culture; ripe and harvested the 10th of August; bound in small sheaves, set up in shocks and capped; left to stand until thoroughly dry; thrashed the first of September; measured in a sealed half bushel, and found to yield three hundred and fifteen bushels of marketable oats. An accurate account of the expenses and profits of the crop were kept, and are as follows:

Expenses.

To 4 days' plowing and dragging, hand and team,.....	$8 00
To 1-2 days' sowing,.....	50

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To 12 bushels of seed at 2s. per bushel, ...	3 00
To 5 days' harvesting,.....	5 00
To thrashing and cleaning,.....	7 00
To hauling and marketing, ...	3 00
	$26 50
By 315 bushels oats at 34 cents per bushel, ...	$107 10
By straw, at $3 per acre,.....	12 00
	$119 10
Leaving a balance in favor of the crop of 4 acres, of,.....	$92 60

Average per acre 75 92-100 of a bushel.

(Proofs as required by the rules of the society.)

BUCKWHEAT.—WILLIAM BAKER, LIMA, LIVINGSTON COUNTY.

The piece sown to buckwheat lay three years to pasture; the soil was gravelly, laying on the west side of a hill; no manure used. It was broke with a two horse team; one day's work per acre; sown on the 9th of July, 1849; harrowed in on the green sod; cut with a cradle; thrashed with a machine. Yield 29 bushels 14 quarts by measure to the acre; market value 50 cents per bushel.

The piece contained about five acres, which had mostly grown over with Canada thistles. I took this method of cropping with buckwheat for their destruction, and I think it will prove successful, for I saw but few at harvest time. I would advise farmers to try the same means upon land infested with Canada thistles. Weight of buckwheat per bushel from 51 to 52 lbs.

The weather being bad in harvest, we think caused a loss of five bushels to the acre.

(Proofs as required by the rules of the society.)

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ROOT CROPS.

Committee—Hon. Orlando Allen, Benj. N. Huntington, Isaac Foster.

Potatoes—Quality considered. H. B. Bartlett, Paris Oneida co., (Carter variety,) 252 bus. per acre, 1st premium, $15.

C. W. Eells, Clinton, Oneida, 246½ bus. 2d premium, $10.

Nelson Van Ness, Westfield, Chautauque, 3d premium, $5.

Potatoes—Quantity considered. Martin Springer, Brunswick, Rensselaer county, 316 bus. per acre, $15.

W. Green of Westfield, Chautauque county, having but 218¼ bus.; no premium by rules of Society can be awarded, 300 bushels per acre being required.

A. Killam of Mexico, Oswego county, presented thirteen varieties of potatoes raised by him from the seed; very fine quality and of vigorous growth. A special premium recommended of $10.

Wm. Newcomb, of Pittstown, presented a statement of his experiments in the cultivation of potatoes, vol. Transactions.

Ruta Bagas.—Joseph Hastings, Brunswick, Rensselaer county, 984 bus. per acre, 1st premium, $10.

Carrots.—E. Risley & Co. Fredonia, Chautauque county, 941 bus. ¼ acre, 1st premium, $8.

Same, 664 bus. ¼ acre, 2d premium, $6.

L. B. Langworthy, Rochester, 574 bus. ¼ acre, 3d premium, $4.

W. D. Osborn, Port Byron 520 bus. ¼ acre.

Discretionary premiums.—John S. Gould, Albany, fine Cocoanut squash, and full grown Cauliflowers, $3.

A. KILLAM, MEXICO.

Mode of Raising seed Potatoes from the ball.

I took the seed in the fall, put them in paper, kept them in a dry place. The first of April 1847, I planted the seed in fine rich earth in a box in the house, kept them there until the 10th June, occasionally in the open air, but not under glass, as I had not prepared the means to force them, which I think would be desirable to gain time and size. I then, (10th June) planted them in the open ground. I protected the vines the first year from frost, to obtain a longer season until the 1st of November. On digging them, I found some as large as hens eggs, the largest portion smaller. They produced seven varieties such as I now give you.

1. Like the English red.
2. " Long and round pink eyes.

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1. " the Pink eyes, but no red in the eye.
1. " the dark purple.
1. " Blue.
1. " the Lady finger of large size.

The second year 1848, I planted the seed raised, like other potatoes, but in rich earth, but did not protect them in the fall to increase the growth. The vines were killed before they were entirely mature. I dug them the 20th October when they were the usual size of potatoes. This year, the vines were killed by the frost as early as the 2d of October, when they were green and growing vigorously, and I believe they would have been larger. They were dug the 10th October. One weighed 1 lb. 10 oz. twelve others 12 lbs. 10 oz. The long potatoes are more mealy at one end than the other, which shows they have not their full growth. I do not know the kind of potato from which the seed from the ball was obtained.

Certificate as to measuring &c., by Asa Sprague and John D. Bouton.

We hereby certify that we this day assisted Aaron Killam, Esq., in measuring the ground and digging, and weighing potatoes for him, with the following result. The first piece 16½ feet square, weighed 175 pounds 13 ounces. We also dug at another place where there were long pink eyes and lady finger potatoes, and found them to weigh 170 lbs. 13 oz. We were particular to dig only what grew on the square rod, measuring to the center between the rows. The potatoes were fine, particularly those raised from the balls. They were very clean from dirt, and carefully weighed. We examined the potato patch and believe they will average as much per square rod, as those we dug and weighed. Mexico 21st, of September, 1849.

A statement of the method of cultivation

The land, half an acre was a pasture; plowed once, 1st of May, 1848; carried on eight loads manure from the cow stalls and eight loads of leached ashes, spread them even, then dragged it well, planted corn about the 10th May, had a good crop on the half acre, plowed it in the fall; about 12th May, 1849, plowed, dragged and planted the half acre without any manure. The soil is fine sandy loam, land rolling, very mellow. The following is the expense of cultivation; plowing and tilling the ground, $1.50; seed, 6 bush. $3; planting, $1.50; hoeing, $1.50; digging will cost about $3; also half a barrel plaster, when up, $1, making the whole expense, $10. I am confident that the half acre will yield at least 230 bushels, which at 4 shillings the bush. is,.. $115 00
Expense of cultivation,..... 10 00

Which leaves a balance of,..... $105 00

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I am confident I could easily sell the potatoes for the above sum, which would be the nice sum of $210, per acre, for use of land and small capital invested.

The following particulars I consider to be important in the cultivation of potatoes. I plowed the land six inches deep; planted the potatoes three inches deep, leaving the hills level with the earth, and I planted the rows 3 feet apart, and the hills two feet from center to center, making 44 hills to the square rod, which give 7,480 hills per acre. Allowing 14 hills for a bushel, (as some of mine yielded,) gives 500 bushels to the acre. I fully believe that if I had had seed from the balls, sufficient to have planted an acre and cultivated them, as I did what I planted, they would have produced at least 500 bushels this season. My land is mellow; did not plow between the rows, but hoed the weeds up, leaving the hills nearly level with the top of the ground until the potatoes grew, and then raised the hills above the level. I believe the usual way of plowing deep between the rows of corn or potatoes is a bad practice, especially in dry seasons; a small cultivator is much preferable.

AARON KILLAM.

WILLIAM NEWCOMB, PITTSTOWN, RENSSELAER CO.

Potatoes.

Experiments continued from last year. Soil a rich loam, from a sward lay inclined to moisture; planted 10th May, 10 bushels long Johns, and 3 bushels Fox eyes, Carters and English whites, and 1 lb. of seed of the variety exhibited, on half an acre. The fore part of the season was cold and wet, and the seed did not germinate and come up with the usual vigor; plowed and hoed them twice, but the principal part of the labor performed with the plow; planted in hills three feet a part, each way, no manure, except as follows: On four rods square, spread four large cart loads of barn yard manure; on the balance, used two barrels of slacked ashes, and two barrels of slacked lime; put no lime or ashes on the portion manured with the yard manure; the lime used on about an equal portion of the balance of the grounds, and the ashes on the residue. The tops of the potatoes continued green during the whole season, but no tubers formed until July, and then very small; continued to grow until the tops were cut down by the severe frosts in October, at which time the tubers were not yet ripened; commenced digging the crop on the 22d October. There was no diseased potatoes on any portion of the lot; but that portion manured with barn yard manure very much injured by being eaten by a large grub; fully one-fourth the crop lost by being eaten. A few of the potatoes eaten by the grub on the part manured with ashes, while the portion manured with lime, entirely es-

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caped. Very little difference in the quantity of potatoes from the ground, except that portion manured with the yard manure, which was fully one-third less. The yield of Long Johns, one hundred and sixty-four bushels, and of the table potatoes, thirty-one and a half bushels. Of the sample exhibited, two small potatoes weighing 1 lb. were planted and yielded thirty-seven pounds.

As the grub mentioned has been exceedingly destructive to potatoes in this section, in some instances nearly destroying the entire crops; I recommend the use of lime freely in the culture of the crop, particularly as it is the best preventive of the potato disease, and also destructive to the grub in the pupa state; but it is also the best manure for the potato itself as it more largely enters into its solid parts than any other ingredient, and serves as a fertilizer to succeeding crops. The potato disease has not shown itself to any extent the past season, and I attribute its absence to the long and continued dry weather at the season of its appearance; from which we would naturally draw the conclusion that all manures attractive of moisture would be injurious, and that the disease is atmospherical and cannot exist without much moisture.

FARMS.

Committee.—Samuel Cheever, Saratoga; B. B. Kirtland, Rensselear; David Sill, Washington.

The committee upon farms respectfully report, that but two farms were presented for premiums: one by E. S. Salisbury, of Ellisburgh, Jefferson county; the other by Helim Sutton, of Romulus, in the county of Seneca.

The farm of Mr. Salisbury is situated between the two creeks called Big Sandy Creeks, in the town of Ellisburgh, Jefferson county, and about four miles from where they come together and empty into Lake Ontario. It consists of 100 acres of land, of which 32½ are in pasture; 6 in meadow; 31½ under the plow; 3 in nursery and garden, and grounds about the house; 27 in wood and in lanes, yards, road and covered with buildings. A public road runs through it. The owner denominates it the "*Green Valley Farm.*"

The soil on a part is a mixture of clay and sand, and residue a gravelly loam. The sub-soil is mostly clay, but on some portions a hard pan, a mixture of clay, sand and gravel, overlaying a lime rock from 5 to 15 feet from the surface; but no surface rock appears on the farm.

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He says his best plan of manuring his clay soil is, to apply all his coarse manure and his dry straw by plowing it in, in the spring, to the depth of 6 to 8 inches, applying the straw of six acres of grain to one acre for corn. He takes the pains to rake it into the furrow as he plows. He applies his fine manure to the surface of his more sandy soil, and harrows it in. He sows plentifully of timothy and clover whenever he sows spring grain, and plows in the grass which he finds grown the spring after taking off the grain crop, which grass he says is 6 to 10 inches high. This he estimates as equal to a good coat of manure.

The committee here take the liberty to remark, that however well this system of fertilizing may have succeeded on this farm, which is one, doubtless, of great natural fertility, they are not prepared to recommend it for general adoption. The straw, instead of being applied dry, should have been used for feeding and bedding the farm stock, either in the stable or in the yard, where it would serve as an absorbent for the liquid manure, and would then have carried nearly if not quite double its value to the soil. They also doubt the propriety of covering any manure so deep as 6 or 8 inches, to remain until a crop is produced. A large per centage of the fertilizing qualities of the manure pass downward on being dissolved, and when burried so deep, they go from the roots of the plant instead of going to them. Nor would the committee recommend for general adoption the plan of plowing in the grass the first spring after sowing; they think clover lays should have at least one years' growth.

Plowing.

His usual depth of plowing is 6 to 8 inches; but he plowed some land the last season, a gravelly loam, 12 inches deep. The effect was, the crops, barley and peas, were 50 per cent. better than those upon the ordinary plowing. They stood the severe drought better. He had similar results from deep plowing for winter crops.

The committee remark, that the deep plowing was doubtless beneficial, as it afforded a deeper medium for the roots to take effect in and protect themselves from the dry weather; and whether the fertility was increased by the native richness of the subsoil or not, it would be sure to be improved by bringing up the rich parts of the manure which the owner had been for years burying there, six or eight inches deep. He has not used the subsoil plow.

Native Trees and Plants.

The trees on his farm are hard and soft maple, beech, elm, basswood, hemlock, ironwood, butternut, black and white ash, and birch.

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The plants are gensing, adder tongue, blood root, colts foot, strawberry, wild turnip, mandrake, poke weed, catnip, motherwort, may weed, thoroughwort, smart weed, pennyroyal, comfry, wild gooseberry, raspberry, dandelions, &c. These trees and plants generally indicate a fertile soil.

Manures.

He makes his manure in his yard, stables and sheds; has no cellar under his barn, but his barnyard is formed like a basin so as to hold the liquid manure. He makes about 200 loads per year, except when he uses the straw dry to plow in for corn, otherwise his corn stalks, straw and pea vines are used for feeding and bedding his stock. He piles up all that is not drawn out in the spring, and re-piles it in July, and draws it out in August on the land intended for wheat. He applies 25 to 30 loads to the acre. His long manure is applied to his hoed crops, as he says it stands the drought better than the fermented manure. This is doubtless from his burying it so deep. He says it makes more grain.

The rotted manure is most successful on the crops of small grain, spread on the surface and harrowed in with the seed. He sometimes plows in corn manure at the first plowing for wheat, with good success. This is doubtless good farming, for the second plowing brings it up again and mixes it with the soil, where the plant wants it.

He cannot, he says, increase his quantity of manure. Has used plaster with good success; applies one to one and a half bushels per acre upon his meadows and pastures, and one bushel per acre to his corn after first hoeing; has not used guano at all, lime and salt but little; sows 12 to 15 quarts of grass seed to the acre, which he thinks equal to a cart load of manure; says he has raised better crops by this process of sowing grass seed than by heavy manuring, say 42 bushels of barley and 80 of corn, where manure had not been used for several years.

This the committee remark is evidence of great fertility in the soil, but it is a course of husbandry not likely to succeed generally.

Tillage crop of 1849.

He had in 1849, seven acres of spring wheat, which gave him 27 bushels per acre; 8 1-8 acres of barley, which gave 31 bushels per acre; three acres of peas, which gave 25 1-2 bushels; 7-8 of an acre of buckwheat gave 21 bush.; two acres of potatoes gave 148 bush. per acre; one acre of beans gave 21 1-2 bushels, and 9 1-2 acres of corn gave 67 bush. per acre.

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Seed.

Sows 1 3-4 to 2 bushels winter wheat per acre, same of spring wheat, 3 1-2 of barley, same of oats, four bushels of peas, from 10 to 20 bushels of potatoes, (pretty indefinite,) eight quarts seed corn, 24 to thirty quarts of beans, (very heavy seeding for beans.) Usual time for sowing winter wheat, last week in August or first in Sept.; spring wheat, 25th April to 15th May; barley, 1st to 10th May; oats same time; plants potatoes 1st May, but thinks the best time 15th to 20th May; corn, 10th to 20th May; beans, 10th June.

Corn this year on sod plowed six inches deep, harrowed mellow, and planted three feet eight inches apart both ways, planted 14th and 15th May with Dutton corn; seed soaked 24 hours in solution of saltpetre, one oz. to one and a half pints of water put on warm, and dried in plaster; hoed three times, using cultivator twice, but not hilled up; corn cut by the ground from 6th to 10th Sept., husked last of October. He applied five bushels of ashes per acre on two acres of his corn, which he says increased the yield 10 bushels per acre, applied soon after first hoeing, and all was plastered.

Prepares seed wheat by soaking in weak lye, pours the wheat into the lye and skims off the impurities which rise to the top, and dries in plaster. This he thinks increases the crop. He says the last has been a very dry year, and his crop less than usual. His crops for ten years have averaged, corn 70 to 85 bushels per acre, wheat 25 to 40, barley 25 to 47, oats 50 to 90, peas 20 to 35, potatoes 250 to 400, meadow 2 1-2 to 3 tons per acre.

This shows a very great range of yield for uniform and good cultivation.

He says of one acre of potatoes this year, he planted nine rods with one variety, which gave him 28 bushels, and the other 150 rods he had 110 bushels, but he does not tell the variety in either case. He thinks the potatoe rot proceeds from the seed, discovers no difference in the disease between early and late planting.

Farm Stock.

He usually keeps from 7 to 10 colts and horses, 3 to 5 cows, 20 to 100 sheep; has this year, 4 oxen, 3 cows, 2 two year old steers broke, 2 calves, 1 breeding mare, 1 single horse, 1 five year old horse, 2 three year old matched colts, 1 two year old horse colt, 2 two year old mares, one last spring colt. His horses are of the stock known in that county as "Farmers Breed." His cattle, are a cross of Durham with native, and says "all his stock are superior animals."

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Cuts from 6 to 10 acres of grass, which, with his corn fodder, straw and bean vines, supply him with fodder. Cuts timothy when the seed is nearly full; clover when in blossom; draws clover in pretty green and salts it freely. His meadow lands are all suitable for tillage; has never practiced irrigation.

The yards about his barn are so arranged that he can separate his stock as he pleases, having all sheltered, and all supplied with running water. Stables his working horses, his oxen and cows; feeds his stock, except his oxen and one pair of horses, on corn stalks, straw and pea vines, until about the middle of March, and then good hay once a day in addition until they go to pasture, and his stock winters well; prefers corn stalks to hay for winter feed. Feeds roots or grain with corn ground in the cob to his oxen and cows, twice a day all winter.

Dairy.

Has made 300 lbs. of butter this year from 3 cows, in the usual way. No cheese made.

Sheep.

He wintered 23 sheep the last winter, 19 ewes, which yielded 103 lbs., 11 oz. wool, or 4 1-2 lbs. each, which he sold for 31 cents per lb. He raised 20 lambs. Has one buck and 3 ewes South Downs; the buck and one ewe he purchased of J. McD. McIntyre, of Albany, for $31.50, and two ewes he purchased of Z. B. Wakeman, of Herkimer, for $20 each. He raised 3 buck lambs from the Wakeman ewes; two have been sold for $25, and for the other he has been offered $15. His other sheep are natives crossed with Merino. His lambs are all from the South Down buck. He sold 8 of the ewe lambs for $3 each, and could sell the others for $2 to the butchers. They weighed on 1st November from 100 to 115 lbs. each. Sold two buck lambs, half blood, for $5 each. He says the premiums he has received from town and county fairs, and the worth of his lambs, will pay for his sheep and the keeping, and give him $1 per head for the 17 ewes that raised the half blood lambs.

Some of these profits at least are rather accidental, and can hardly be regarded as the regular result of sheep husbandry.

Has sheds to shelter his sheep, and has good water for them; feeds corn stalks, straw, pea vines and bean pods, with occasionally a little hay until middle of February; stalks, straw and all the hay they will eat with 8 quarts of corn to 30 sheep from 1st January until they go to pasture. He feeds 4 or 5 times a day, and with great care looses no sheep in the winter. Litters his sheds with straw.

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Hogs.

Keeps from 4 to 8 hogs of the Berkshire breed, which weigh at 18 months old from 350 to 600 lbs. Has three this year which will weigh 600 when fattened. Feeds corn, with slops from kitchen in summer, and after 1st September adds ground peas and barley. Does not feed potatoes since they have become so dear. Does not consider them worth more than one-fifth the value of corn to feed hogs, but more for milk cows. Does not raise other roots.

Fruit.

Says he has 1 1-2 acres in apple orchard with 76 bearing trees of choice fruit and 20 young trees. The varieties are Rhode I. Greenings, Spitzenburghs, Golden Sweets, Seek-no-further, Ox apple, Royal Sweet, Hubbardston None-such, Northern Spy, Lady apple, with many others. Sold this year 166 bushels of early apples, at 29 cents per bushel; had 244 bushels of winter apples, sold 244 at 50 cents. Has several young cherry trees set out in 1847, of the best varieties, and pears set out the same time, also of the best varieties known in the country, with several plums, peaches, quinces, apricots, and most of the small fruits.

The ground around his house comprises about 1 1-2 acres, and is set with some 60 kinds of ornamental fruit and forest trees, including all kinds of ever greens. The road through the farm is set upon each side with maples. Has a nursery of an acre of ground, planted with almost every variety of fruit and ornamental trees. His grounds about his house are set with shrubs, plants and flowers. He has a good vegetable garden for the use of his family. He destroys the catterpillars upon his trees by dipping a swab in strong lye and applying it to them, which he says kills them at once. He destroys the *slugs* from his cherry trees by sprinkling ashes on them while the dew is on. He scrapes the rough bark from his trees in the spring, and applies a wash made of 3 lbs. lime, 1 of soap, 1 of salt, 1 of ashes, 6 of cow dung, 7 1-8 of brimstone. This destroys the eggs of the insects, makes the trees grow smooth, and he thinks, makes them hold their fruit.

The committee think well of Mr. Salisbury's mode of treating fruit trees, and recommend it for adoption.

He gives the result of an experiment upon 6 acres of corn. Upon 4 acres he drew 32 loads per acre of rotted manure in August, after a

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wheat crop; spread the manure upon 2 acres, and left the other not spread. In the following spring he put 32 loads per acre of long manure on the other two acres, and spread it, together with that remaining not spread on two acres; plowed, treated and cultivated all alike. On that manured in August with rotted manure, and spread, and on that manured in the spring, the crop was 80 bushels per acre, and on the other two acres, 68 per acre.

Buildings, Fences, &c.

He numbers 15 buildings upon his farm.

No. 1, a dwelling-house, of blue lime stone, built in 1836, 42 by 26 feet on the ground, and 1½ stories high; stone hauled 1½ miles; cost $2200; cellar under the whole house, 9 feet deep. Of the internal arangement of the house the committee have no information, as they have not seen the diagram.

No. 2 is a kitchen and wood house, one story high, built of wood.

No. 3 is an ash-house of stone, 8 by 10 feet, and 8 feet high, well finished.

No. 4 is a horse-barn, of wood, well finished, and painted; lower part 32 by 32; the upper part 32 by 24, laid with boards, and the covering planed and matched; finished with stalls, mangers, harness room and granary, with a cistern at one end of the floor, holding 90 barrels, with a pump in it. Cost, $175.

No. 5, a horse-shed, or carriage-house, at the end of last barn; open in front, 24 by 20 feet; one story high, well finished, and painted. Cost, $75.

No. 6, a hog-house, 24 by 20; one story high; finished into 4 pens, with an alley through the center, leading to a steam-house at one end.

No. 7, a steam-house, 24 by 20; two stories high; lower part of stone, with a cellar for roots, 24 by 8 feet, with a caldron set, and a steam-box holding 16 bushels; the upper story finished for a granary. Into this upper room a team can be driven, and the roots dropped from the wagon through a trap door into the cellar below. The upper part of the hog-house is used as a store room for farm implements. Cost of the steam-house, say $150.

No. 8, a cow-house, 24 by 18, and 14 feet high; a granary above, and corn cribs on the sides, with a thrashing floor 17 by 13 feet. Cost, $75.

No. 9, shed for cattle, 24 by 13, on south side barn yard.

No. 10, shed for cattle, on west side yard, 37 by 24, 14 feet high; upper part for hay.

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No. 11, grain barn, 37 by 27, thrashing floor, bay and stable for cattle.

No. 12, grain or hay barn, 56 by 30; contains a thrashing floor, stables for cattle, and a large bay. Cost, $300.

No. 13, shed for sheep, north end of small barn, and west of large barn, 33 by 16 feet.

No. 14, spring house, built of stone, 10 by 8, and 7 feet high.

No. 15, a hen-house.

No. 16, a tenant-house, 24 by 18 feet, 1½ stories high. Cost, $300.

All the buildings in good repair, and well built.

Fences.

Whole number of rods of fence on the farm, is 1106; cost an average of 53 cents per rod. The fence is made, some of cedar rails, staked and capped, some of large cedar posts and rails, some of cedar posts and hemlock boards, pinned on with cedar pins instead of nailing. His yards are fenced with post and board fence, tight and high. His grounds around his house with picket fence, with an ornamental fence in front of his house. Has 9 gates and 13 pair of bars upon the farm. Says he keeps regular accounts of the productions and of the expenses of his farm; the cost of labor, the time and name of the person performing it, the quantity of everything raised, how much sold, and the price, the cost per acre and per bushel.

He gives as a specimen, the cost of cultivating 8 1-8 acres of barley in 1849, as follows:

Sowed April 26, 1849:

1st. Plowing and harrowing 6 days,.....		$7 50
Harvesting and drawing into barn, 1 1-2 day per acre,.....		9 00
Thrashing, 3 cts. per bushel,.....		7 44
My hands to thrash and stack straw, 6 days,.....		4 50
Drawing to market, 2 1-2 miles, 5 loads,.....		2 00
30 days board, 18 cts. per day,.....		5 40
26 bushels seed barley, at 50 cts.,.....		13 00
Interest on land, at $60 per acre,.....		34 09
Sowing seed barley 3-4 day,.....		75
		$83 68
Cr.		
By 248 bushels barley, at 49 cts,.....	$121 52	
16 large loads good bright green straw, 20s. per load,	40 00	
	$161 52	
Net profit,.....		77 84
		$161 52

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Net profit per acre clear of interest and all expense $9.58.
Cost of barley per bushel exclusive of interest, 19 cents 9 mills.

He renders the account of his farm for 1849, as follows:

Grain.

By 636 bushels of corn, at 4s.,		$318 00
175 bushels of wheat, at 8s.,		175 00
248 bushels of barley, at 49 cts.,		121 52
77 1-2 bushels of peas, at 75 cts.,		58 13
18 bushels buckwheat, at 50 cts.,		9 00
21 1-4 bushels of beans, at 8s.,		21 25
1 bushel of Timothy seed, at 20s.,		2 50
		$705 40
273 bushels of potatoes, at 3s.,		102 38

Hay, Stalks and Straw.

18 tons hay, at $7,	$126 00	
9 loads pea straw, cut green,	9 00	
16 large loads barley straw, green,	40 00	
20 loads wheat straw, 4s.,	10 00	
1 load bean pods, 12s.,	1 50	
28 loads corn stalks, 16s, (19 tons,)	56 00	
		242 50

Apples and Wool.

116 bushels apples, sold at 29 cts.,	$48 14	
244 winter, sold for 4s,	122 00	
103 1-2 lbs. wool at 31 cts.,	32 09	
		202 23

Poultry, Butter and Sugar.

Poultry, mostly Dorking fowls,	$37 50	
30 doz. eggs, at 9 cts.,	8 10	
300 lbs. butter, at 13 cts,	39 00	
354 lbs. maple sugar, 8 cts.,	28 32	
		114 92

Growth and profit on Stock.

1 pair 3 year old colts, matched,	$50 00	
1 two year old mare colt,	20 00	
2 one year old mare colts,	30 00	
1 last spring colt would not sell at all,	50 00	
		150 00

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4 four year old oxen, gained since last spring in weight 1000 lbs.,	$35 00	
2 two year old steers,	8 00	
2 calves,	10 00	
3 pigs, weight 500 lbs., at 3 cts.,	15 00	
		68 00

Lambs.

2 buck lambs, full blood South Down,	25 00	
2 " half blood "	10 00	
8 ewe lambs, sold for 24s. each,	24 00	
8 wether lambs, worth 16s.,	16 00	
1 ewe sold for $10,	10 00	
1 buck lamb, saved for self, offered	15 00	
		100 00
Premiums received at town and county fairs, on cattle, colts, sheep and lambs,	$32 00	
Value growth of nursery, 1 acre,	20 00	
Rent of tenants house,	20 00	
Garden produce, onions, carrots, beets, &c.,	20 00	
2 loads pumpkins,	2 00	
1,430 feet hewed timber from the wood land, at $5 per 100 ft.,	71 00	
7,000 feet beach and bass wood timber from wood-land, at $6 per 1,000. ft.,	42 00	
1,800 lbs. pork, at $5,	90 00	
		299 50
		$1,972 93

Farm Expenses.

Labor by the month from December, 1848, to December, 1849.		
1 hand 10 months, at $12.50 per month,		$125 00
1 " 5 " $13 "		65 00
Hands by the week and day, at average of 60 cts.,		54 04
Board of hands by the month, week and day, at 10s. per week,		96 18
Seed grain sowed on the farm:		
Timothy and clover seed,	$9 36	
Wheat, peas, barley, beans, potatoes and corn,	45 38	
Taxes on farm,	14 00	
Insurance on $2,800 per year,	1 98	
Blacksmith's work this year,	8 11	
		78 83

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12 tons of hay, worth at the time it was fed, $5 per ton,....	60 00
18 load stalks, $2.50 per load,.....	45 00
8 acres oat straw, at $2.50.....	20 00
40 bushels corn fed to sheep and cows,.....	20 00
50 bushels corn to keep and fatten hogs and pigs,.....	25 00
	$589 05
Deduct $50 for labor and board for work done off the farm, and for getting in 11 acres of winter wheat after barley,.	50 00
	$539 05
Deduct this amount from the proceeds of the farm $1,982 93 leaves,.....	$1,443 88
As the clear profit, exclusive of interest, which would be about,.....	350 00
	$1,093 88

He says the lumber with which the farm is credited was mostly from fallen and decaying trees, and is no more than the value of the annual growth of the woods on the farm. He credits the farm with $103 for the lumber. There are 27 acres of wood, which at $50 per acre, the price he puts upon his farm, including buildings, is $1,350. The interest of which at 7 per cent is $94.50.

Mr. Salisbury says, that in 1839, at the then price of produce, his farm produced $2,322.82; in 1840, $1,762.19; in 1845, $1,895.83, and these amounts are not far from the average of the profits of his farm for several years, exclusive of expenses. That for two years past he has raised 30 acres of corn, which has produced 75 bushels per acre, weighed in January.

This is evidently a farm of great fertility by nature, and has produced for long series of years very large crops with but a small amount of manure, being less than three loads per acre per year, for the cultivated part of it. The results, as stated, would seem to show that the system pursued by Mr. Salisbury has been successful on that farm; but it would probably not result so well on farms generally, indeed the committee are of opinion that with most farms in the State, to take off crops for a long series of years, returning but 3 loads of manure to the acre, with a bushel to a bushel and a half of plaster, and occasionally plowing in the grass the spring after the seed is sowed, would be followed by exhaustion.

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Mr. Salisbury began upon this well selected spot about 30 years ago, as he says, at the age of 19, with no capital but his axe and a wife 17 years old. He has, and that mainly by his own hands, caused the forest to give way to a rich and highly productive farm, on which he has a handsome and substantial dwelling, with an ample supply of outhouses, well and economically arranged for the purposes intended and for general convenience.

He has recently furnished himself with fruit of all varieties and the choicest of their kind. He has ornamented his grounds with shade trees, shrubbery and flowers, in fine he has, by his perseverance and well-directed efforts, placed himself, although yet in middle age, in a state of independence and ease for the remainder of his life.

The committee however repeat that although his system of farming has proved successful on his particular farm they cannot recommend it for general adoption. They also think the account of the annual production of the farm is made in a way calculated to show more net profit than is derived from a regular farming course.

The other farm presented for premium, that of Mr. Helim Sutton, situated in the town of Romulus, in the county of Seneca, consists of 218 acres. Thirty-two of which are in wood; 18 have recently been cleared and are used for pasture, the residue, 168 acres, are under cultivation. There is no waste land on the farm.

Soil.

The soil is of clay formation, mixed with gravel, and some loam, and some parts are alluvial or black muck, as represented by the owner. There are small loose lime stones upon the surface with what he calls "hard heads," and some large boulders, and the subsoil is mixed with limestone. He says thorough draining, heavy manuring and clean cultivation are the best modes of farming and improving; but he has not done much at thorough draining.

Plowing.

He says he always plows 6 inches deep and when the soil is in good condition, 6 to 8, and sometimes more, "if his team can draw it," and always finds deep plowing best for the crop. That he has taken out the bottoms of his ditches and spread it upon his land and found it beneficial for 3 or 4 years.

This is doubtless owing to the fact that the land there has so much of lime and potash in the formation that the subsoil is a rich storehouse of fertilizing matter. He says he has not used the subsoil plow but intends to do it.

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Trees and Plants.

The *trees* indigenous to his farm are white oak, red and black oak, elm, basswood, beech, sugar maple, soft maple, iron wood, mulberry, black walnut, hickory, wild plum and hazle nut.

The *plants*, snake root, cranes bill, sweet cicily, wild turnip and many others, whose names he does not know.

Manures.

He makes his manure in his barn yard and sheds. He has no cellars under his barn to save or make manure; thinks they would be unhealthy for his animals and for men. He carries all his vegetable substances to his barn yard and hog pen to work into manure; makes from 400 to 600 loads of manure annually. Applies to his corn crop in spring from 15 to 30 loads to the acre, according to the condition of the land, and the balance goes on to his summer fallow and is first plowed in and then plowed again and mixed with the soil. Puts his longest manure on his corn and the shortest on his potatoes. He would prefer rotted manure for all purposes, but to compost it is too expensive and he would be too long out of the use of it if he "waited for it to rot in the natural way." He applies the manure from his hog pen to his garden and fruit trees.

He saves all his ashes and burns no straw. He has used lime but not successfully. But the committee remark that the result was what he should have expected. He applied a large quantity to a heap of long barn yard manure, and it burnt it up and he correctly judged that the ashes were not worth as much as the manure before burnt.

He uses some plaster with good effect; sows ½ bushel to the acre after mowing his clover for hay, and thinks it aids the second crop, which is raised for seed, and he says profitably in that part of the State, but does not tell the amount or value of the crop.

Tillage Crops.

Cultivates annually about 35 acres of wheat, fallowed annually with same amount in seed clover, same amount summer fallowed before wheat; 12 acres to corn; 25 to oats; two acres to potatoes; 15 in timothy meadow and the residue of the 168 in pasture. Sows two bushels of seed wheat to the acre, from 10th to 25th Sept., drags the land 4 times after sowing; harvests in the usual manner; yield this year, 24½ bushels per acre. Oats, sowed 3 bushels per acre, dragged 4 times, sowed from 20 April to 10 May; harvested at the usual time and in the usual way; yields, as he estimates it, 60 bushels per acre.

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Corn is planted, 4 quarts of seed to the acre, from 15 to 25 May, by hand. Plows between the rows, as nigh the hills as possible, 3 or 4 times in the season, as deep as the horse can draw the plow. Cut and shocked up last of Sept., and husked in October; yield this year, 109 bushels of corn per acre, measured in a basket.

Potatoes planted by hand with hoe in May, cuts the seed so as to have 4 eyes in a piece and one piece in a hill, 7 bushels of seed per acre; dug in Sept.; yield this year small, only 200 bushels per acre; corn and potatoes planted 3½ feet apart, each way.

He describes an insect which he found in his wheat, which he says he does not know much about. From his description it is undoubtedly the "*grain worm or wheat midge*," whose habits are so well described and of which drawings are furnished by Doct. Fitch, of Salem, Washington county, at page 580 of the Transactions of this Society for 1845. The committee have only to remark that they hope that neither Mr. Sutton, nor any of the wheat growers west will have as much cause to regret an acquaintance with this worm as have the farmers in the valley of the Hudson for the last 18 years.

Has suffered heretofore from the potato disease but not this year, nor have his neighbors.

Grass Land.

Seeds his meadows with timothy, 16 quarts to the acre; sows clover for seed, using 12 lbs. of seed to the acre; sows the timothy and clover in March or April. His meadows yield 2½ tons per acre of timothy hay; cuts the timothy when out of blossom, lets it wilt a little and then puts it in small rows for 2 days and then houses it. Cuts some clover for sheep hay, cuts it when the blossom gets a little turned, wilts it a little, then puts it in small cocks for 3 or 4 days, then opens it, dries and houses it. Thus cured it is the best of hay for sheep.

All the land on his farm is plow land, if not so by nature is made so by ditching. He says he has not watered any land, but has bestowed his time and money to get the water off his land. No land, he says, but meadow could be benefited by it, and then, although the grass might be increased in quantity, it would be deteriorated in quality and he doubts the policy of it.

As to the advantages of irrigation the committee disagree with Mr. Sutton altogether. It may be and is applied with great advantage to meadows, to pastures and under certain circumstances, to grain crops and gardening.

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Draining.

Mr. Sutton says, he had 7 acres of low, wet land which he cropped with oats for 4 years, putting on 25 loads of manure to the acre each year. He then under drained it, cutting his drains 2½ feet deep and filling 18 inches with stone, then filling up with earth; length of drain on 7 acres, 213 rods, cost 30 cents per rod. His crop before draining, with manure, was 31 bushels per acre. After draining, first crop without manure, 89½ bushels, and has continued to produce well. He now drains all his wet spots as fast as he can.

Domestic Animals.

He says, "*I never owned an ox*," which, the committee take the liberty to say, is not very much to his credit as a farmer, for the ox, like the cow, under good treatment, pays for himself twice, first in work and then in his beef, and the cow, first in her milk and then in her beef. His cows are selected from the common stock of the country, and as he raises heifers if they come in and promise well he retains them, if not they are disposed of, and in that way he gets good milkers.

He keeps 8 cows, 19 young cattle and 5 work horses, two of the horses have been in his harness 17 years. They are of the Messenger stock, two of Durock and one a mare of Eclipse stock. He prefers large horses for farm team, for he thinks much of the farmer's crop depends upon the power of his team. Considers it good economy in keeping farm stock to feed well and shelter well.

Dairy.

Keeps from 6 to 12 cows and their average product is from 200 to 225 lbs. of butter per head, varying according to the season, and a larger or smaller proportion of young cows coming in. He milks early and regular, strains into pans and skims when ready, according to the season, churns every morning after cream has stood in pots long enough, rinses the butter twice in cold water, it is then salted and worked twice afterwards with ladle until the brine is clear, then packed in clean firkins, observing cleanliness throughout.

Sheep.

He keeps 100 sheep of merino breed, cut last spring 4¼ lbs of wool per head, which he sold at Ovid for 34 cents per pound; some bucks cut 8¼ lbs.; culls his flock and sells as others do. Feeds in winter of hay from the small clover and 4 quarts of meal daily to 100 sheep. Keeps no coarse-wooled sheep.

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Hogs.

His hogs are of the Leicester breed, and weigh from 300 to 350 at 18 months old. Feeds on slops from the house and clover pasture through the summer, and after harvest feeds boiled potatoes and apples until middle of October, and then corn in the ear.

Thinks apples worth half as much as potatoes for hogs, and potatoes half as much as corn; says potatoes and apples are not worth much for feed without cooking. That corn is better for being ground; that turnips, beets and carrots are not profitable for hog feed. Thinks peas equal to corn. The committee remark, they ought to be better, for they are generally worth from 50 to 100 per cent more in market.

Fruit.

Says he has 125 apple trees of grafted fruit, such as Fall pippin, Winter pippin, Newtown pippin, Greenings, Lady apples, Swaar, Spitzenburgh, with others. 150 peach trees, 100 of them worked trees, bearing 10 varieties, beginning with the early rare ripe and ending with those ripe in middle of October. Had 80 plum trees of choice varieties, but has lost most of them from the black rot on the branches; tried to save them by all manner of washes, but could not. Has a supply of the good varieties of cherries. Manures his trees with hay manure, and scrapes the rough bark from the apple tree. Thinks the latter makes them thrifty and the fruit fairer.

Ornaments.

He has a small artificial pond fed by springs on his farm. Has a row of yellow locust trees set along the west side of his farm, which, when in flower, are very ornamental and fragrant. Has so fenced his farm as to bring water into every lot.

Buildings and Fences.

His dwelling is 32 by 30 feet on the ground, and 1 1-2 stories high, with a piazza on the west side, under which he draws water from the well; from a rain water cistern, water goes down cellar and to the wash house. The wood house is 36 by 20, at one end of which he has a work shop with carpenter and other tools, for doing repairs to implements, &c., and another part for storing household implements and drying clothes. He has a cellar under the whole of his house, well divided. The main body of the house is well arranged for comfort and convenience, and the chambers for lodging rooms.

Barn.

His barn is 50 by 34, and 18 feet part finished for a grain barn. At one end a granary which will hold 2000 bushels with suitable bins. At

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the other end stabling for 12 horses, being 34 by 17 feet. On each side of the barn opposite the stable, is an open shed 50 by 20 feet, under which a team can be driven, so as to pass into the stable under shelter. A cow house is between the house and barn. Has a wagon house 36 by 22, with loft for storing farm implements, &c. Has a stone ash house and smoke house. A hog house, with a paved floor, and a caldron for cooking feed and scalding hogs, and tubs for holding the feed. The hogs are fed through spouts that lead to the troughs. Has one hay barn 45 by 32, and uses the lofts of his sheds for hay. Has four tenant houses, one blacksmith shop. Buildings all in good repair.

Fences.

There are 6 miles 259 rods of worm fence upon the farm, mostly of oak rails, and 8 rails high. About one half staked with upright stakes, connected under the rider by a cap, some of it with a stake on each side, and some, which he prefers, with both stakes on the same side. Has 50 rods of post and board fence, and he says 40 of boards and mulberry posts. The board fences are about his buildings. The rails were obtained on the farm and are worth $3 per hundred. All in good repair.

Says he measures and weighs all his crops, which he superintends himself, and so keeps accounts that he can at any time show a balance of debt and credit, which he thinks essential to good farming. The following he gives as a specimen of his farming accounts:

Crop of corn, *Dr.*

10 acres, 9 days plowing, 12s,.....	$13	50
4 days dragging, 12s.,.....	6	00
1 day working with marker, 12s.,.....	1	50
May 23. 10 days planting, 6s.,.....	7	50
2 bushels of seed,.....	1	00
June 10. 1 plowing out, 4 days, 8s.,.....	4	00
25. 1 " 4 days, 8s.,.....	4	00
July 8. 1 " 4 days, 8s.,.....	4	00
17. 1 " 4 days, 8s.,.....	4	00
Sep. 27. 10 days cutting and shocking, 6s.,.....	7	50
Oct. 28. 26 days husking, at 6s.,.....	17	50
Nov. 4. 3 days team and 2 hands, 16s.,.....	6	00
	$68	50

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Cr. for corn.

1090 bushels of ears, 2s.,	$272 50
20 loads of stalks, 8s.,	20 00
	$292 50
Expense besides capital,	68 50
	$224 00

Nett proceeds for the use of 10 acres well manured and planted with corn for 1849, $224.

I might give like copies of each crop and expense of all the crops that I have raised.

The nett proceeds of my farm for 1849, after paying all my expenses for repairs, labor and living, amounts to $859.20.

Mr. Sutton has omitted altogether to give in detail such an account of his farming operations for the last year as the rules of the Society require to entitle him to a premium.

He does not mention the use of the hoe, nor does his specimen of account show any use of the hoe in his corn field after planting. The committee remark that it would be singular with the use of so much long manure upon his corn ground, if there were not too many weeds, to be got out of the hills by the cultivator or plow. If he wished to commend such a system of corn culture, he should have been particular to tell us whether any seeds spring up in his corn hills, and if so, what he does with them.

Mr. Sutton's farm is doubtless a good one. His buildings are of good character and well arranged His farm must, from the quantity of fence he gives, be well divided into lots, and his buildings and fences are all in good condition. He gives one experiment in under draining, which has proved very successful, more than doubling a crop of oats the first year, and says he intends to pursue it.

The product of his cows in butter is high for so large a number, as 6 to 12, to wit, 200 to 225 lbs. per cow. The course he pursues of rearing heifers until they come in, and then selecting and retaining only the good ones, is, in the opinion of the committee, to be commended, and if more generally followed, our country would be filled with better milking stock.

The farm of Mr. Salisbury is a good one—is highly productive—but his system of farming does not come up to what the committee think it should do, to entitle him to the society's first premium. They award

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to him the second premium, a Silver cup of the value of thirty dollars.

To Mr. SUTTON they award a set of the Society's Transactions.

S. CHEEVER,
B. B. KIRTLAND,
DAVID SILL,
Committee.

FRUITS.

Dr. Herman Wendell, from the committee which consisted of Sanford Howard, R, J. Pardee and himself, made the following report, viz:

The committee on fruits beg leave to suggest the following varieties as worthy of being added to the lists heretofore recommended for general dissemination and cultivation, viz:

APPLES—DOMINIE, WINE APPLE and PECK'S PLEASANT.

PEARS—DOYENNE D'ETE, ANDREWS, FLEMISH BEAUTY and URBANISTE.

PLUMS—MADISON.

CHERRIES—KNIGHT'S EARLY BLACK, GRAFFION, BLACK EAGLE and DOWNER'S LATE.

PEACHES—OLDMIXON FREESTONE, BERGEN YELLOW and CRAWFORD'S LATE.

GOOSEBERRIES—WOODWARD'S WHITESMITH, CROWN BOB and GREEN WALNUT.

CURRANTS—KNIGHT'S SWEET RED, WHITE GRAPE, and MAY'S VICTORIA.

RASPBERRIES—FASTOLFF, FRANCONIA and WHITE ANTWERP.

And in addition they beg leave to report, that no new seedling winter apples or pears have been offered for the premiums of the Society; but that a very fine display of the well known standard varieties have been exhibited from various sections of our own and neighboring States, full lists of which are hereunto appended, viz: By Charles Ross of Washington county, Esopus Spitzenburg and Rhode Island Greening, Apples. By Charles Lee of Penn Yan, Yates co., Cabashea, a Western N. Y. seedling, variety of inferior quality, unworthy of dissemination. By John Parks of Gates, Baldwins. By Benjamin Hodge of Buffalo, Swaar, Smokehouse, Roxbury Russets and Newtown Pippins. By J. W. Bailey, Plattsburgh, Bailey's Spice. By Ellwanger and Barry,

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Rochester, Northern Spy, Norton's Melon, Esopus Spitzenburgs, R. I. Greenings, Pomme Gris, and Golden Russets. By Ezra P. Prentice, Mount Hope, Albany, Rhode Island Greenings, Roxbury Russetts, Scarlet Nonpariels, Flushing Spitzenburgs, Bullock's Pippins, Winter Sweets, Herefordshire Pearmains, Ancient Britons, Golden Pippins, Gloria Mundis, Killham Hills, Swaars, Red Gillifleurs, Chandlers, Scolloped Gilliflowers, Hoary Mornings, and Newtown Pippins. By Dennis Clark, Palmyra, Swaar, Twenty Ounce, Esopus Spitzenburgs, Roxbury Russetts. Rhode Island Greenings and Red Gillifleurs. By Hiram Foster, Palmyra, Wine Apples, Poughkeepsie Russets, Tewkesbury Winter Blush, Rhode Island Greenings and Swaars. By R. G. Pardee, Palmyra, very finely kept Catawba Grapes, retaining their flavor; these Grapes were kept by sealing the stem of the cluster when the fruit was fully ripe and packing them in cotton. By L. P. Grosvenor of Pomfret, Conn., who well deserves the thanks of the Society for his fine display, Ribston Pippins, Chandlers, Nonsuch, Danver's Winter Sweets, Roxbury Russetts, Fall Harveys, Baldwins, Poughkeepsie Russetts, Rhode Island Greenings, Esopus Spitzenburgs, Pomme Royales and Hubbardston's Nonsuch. By J. C. Hubbard of Troy, Michigan, who will accept the thanks of the Society for his fine display, the comparison of which with the same varieties grown in our own State was exceedingly gratifying to the committee, Swaars, Pomme de Neige, Westfield Seek-no-further, Seedling Sweet, Rhode Island Greenings, Royal Russetts, Poughkeepsie Russetts, Pound Sweets, Roxbury Russetts, Esopus Spitzenburgs, Holland Pippin and Steele's Red Winter, a western variety, probably a seedling from the Esopus Spitzenburg, which it somewhat resembles, but to which it is inferior. By Dr. Herman Wendell, Albany, Inconnue, Van Mons Pears, White Winter Calville, Seedling Winter Sweet and Vandervere Apples. By Robert Patterson, Perry Centre, Wyoming co., Baldwins, Peck's Pleasants, Federal and Ribston Pippin Apples. By Henry U. Underhill, Macedon, Wayne co., Rhode Island Greenings, Poughkeepsie Russetts, and Esopus Spitzenburg Apples. By Samuel Morgan, Pine Grove, near Albany, Fall Pippins, Esopus Spitzenburgs, Vanderveres, Red Gilliflowers, Roxbury Russetts, Nonsuch and Baldwins; this exhibition of Mr. Morgan well deserves special commendation, as the fruit was grown on what has heretofore been called the Pine Barrens, they evince in their fine size and beautiful appearance what those lands by proper manuring may be made to produce. By J. H. Watts, Rochester, Northern Spy and Baldwin Apples. By J. J. Viele of Troy, Marston's Red Winter Apples. By Joseph Cary, Albany, very finely kept Isabella Grapes and also Cataw-

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bas. By Jas. D. Campbell, Rochester, Westfield Seek-no-further, Baldwins, Pomme Gris, Rhode Island Greenings and Esopus Spitzenburg Apples. By S. Miller, Rochester, Winter Virgalouse Pears. By Wm. H. Rogers, Williamson, Fall Pippins, Newtown Pippins, Blue Gillifleur, Westfield Seek-no-further, Talman's Sweeting, Poughkeepsie Russetts, Golden Russetts, Rhode Island Greenings, Hubbardston Nonsuch, Ramsdell's Sweet and Swaars.

They have awarded the premiums as follows, viz:

To J. C. Hubbard, of Troy, Michigan, a volume of the Transactions and Thomas on Fruits.

To L. P. Grosvenor, of Pomfret, Conn., a volume of the Transactions of the Society and Downing on Fruits.

To R. H. Brown, of Greece, Monroe co., a volume of Transactions.

To J. H. Watts, Rochester, a volume of Transactions.

To J. D. Campbell, of Rochester, Thomas on Fruits.

To E. P. Prentice, of Albany, Downing's Fruits.

To John Park, of Gates, Monroe co., Thomas on Fruits.

To F. W. Lay, of Greece, " Downing's Fruits.

To Henry A. Underhill, of Macedon, Wayne co., a vol. of Transactions

To R. J. Pardee, for Apples, Downing's Fruits; for Grapes, Thomas' do.

To Hiram Foster, of Wayne county, Thomas on Fruits.

To Dr. Herman Wendell, of Albany, for Pears and Apples, Downing's Fruits.

To J. W. Bailey, of Plattsburgh, a volume of Transactions.

To S. Miller, of Rochester, Thomas on Fruits.

To B. Hodge, of Buffalo, a volume of Transactions.

To S. Morgan, of Albany, a volume of Thomas on Fruits.

To Charles Ross, of Washington co., a volume of Transactions.

To Ellwanger & Barry, Rochester, a volume of Transactions.

To Wm. Rogers, of Williamson, a volume of Downing's Fruits.

To Dennis Clark, a volume of Thomas on Fruits.

To Robert Patterson, of Perry Centre, Wyoming, a volume of Thomas on Fruits.

To J. J. Viele, of Troy, a volume of Thomas on Fruits.

To Joseph Cary, Albany, Isabella Grapes, Thomas on Fruits.

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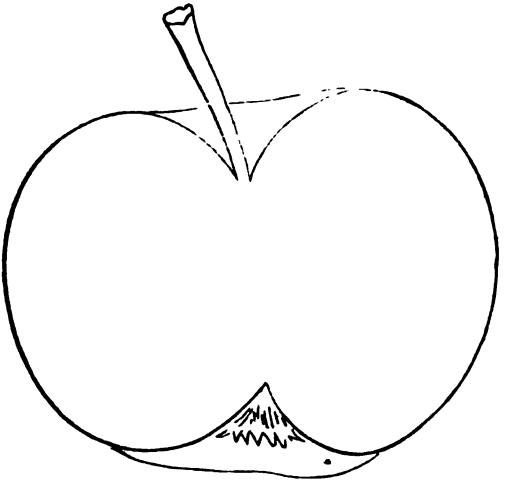
Descriptions of the Fruits recommended for general dissemination.

APPLES.



DOMINIE.

SYNONYM.

Rambouillette.

SIZE—Medium, being usually about two and six-tenth inches broad, by about two inches in depth.

FORM—Oblate, and somewhat globular.

EXTERIOR COLOR—Greenish yellow, with stripes and dashes of crimson, and a profuse sprinkling over the whole surface of whitish russet specks; it is also slightly russet around the base of the stem.

TEXTURE—Fine grained and tender, as well as firm, also quite juicy.

COLOR OF FLESH—White.

FLAVOR—Very pleasant, sprightly, vinous, sub-acid, and quite refreshing, but not rich.

CORE—Large and open.

SEEDS—Long, large, and light brown.

STEM—About an inch long, slender, inserted in a wide, deep cavity, and curved to one side.

EYE—Small, and set in a broad basin, somewhat scolloped or ribbed.

SEASON—From December, through the winter, and until April.

GROWTH—The growth of the tree is very rapid, the wood smooth, light brown and hardy, the leaves large and easily distinguished.

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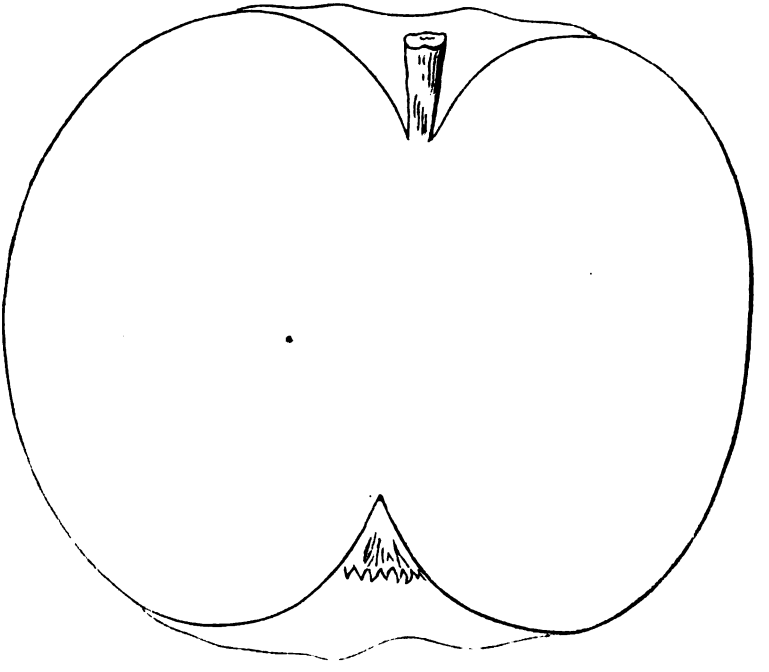
The Dominie is well worthy a place on our select list of fruits, as it is hardy and thrifty, an exceedingly abundant bearer, of pleasant and agreeable flavor, and also beautiful in appearance. Its origin is somewhat obscure, but it is probably a native seedling. It resembles the Rambo in appearance, but that is a late autumn variety, this keeps through the winter. The Wells Apple of Ohio is supposed by some to be a synonym of it.



WINE APPLE.

SYNONYMS.

Hays' Winter.

Hays' Apple.

SIZE—Large, being, when well cultivated, the size of our outline.

FORM—Globular and slightly oblate.

EXTERIOR COLOR—Of a deep rich red, striped and dashed with yellow, often quite indistinctly, and frequently a yellowish russet around the base of the stem.

TEXTURE—Crisp, but tender and juicy.

COLOR OF FLESH—Yellowish white.

FLAVOR—Rich, and sprightly vinous, acid.

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Core—Large.

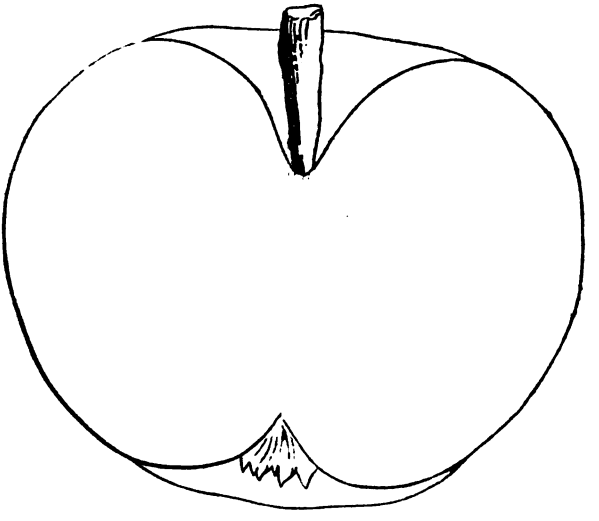
Stem—Short, seldom or ever rising above the outline of the fruit, and inserted in a deep, round and smooth cavity.

Eye—Large, and set in a deep and broad basin.

Season—Ripe in October and keeps in fine condition until March.

Growth—Its growth is thrifty and vigorous, making a beautiful tree, it is also hardy and productive, its leaves are small and easily recognized.

The Wine Apple is richly entitled to a place on our list, for it is not only beautiful in appearance but it is hardy, productive and of a flavor which is peculiarly agreeable to most persons; it is also equally well adapted to the dessert and kitchen, and makes most delicious cider; in fact we could not recommend to our agricultural population a more useful fruit. It originated in the State of Delaware and is very popular where well known. As there are many spurious varieties sold as the Wine Apple, cultivators must be cautious of whom they purchase their trees.



PECK'S PLEASANT.

Size—Large, often three and a half inches broad by somewhat over two and a half in depth, the outline above is from one of medium size.

Form—Usually globular and slightly oblate, as well as rather angular, as will be noticed in the outline, also often slightly furrowed on one side.

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EXTERIOR COLOR—Yellow, with a beautiful, bright rosy blush on the exposed side, and around the stem, and also a large number of scattered whitish grey dots over the surface.

TEXTURE—Firm, but fine grained, tender, and very juicy.

FLAVOR—Rich and delicious, vinous sub-acid, much resembling that of the Newtown Pippin.

COLOR OF FLESH—Yellowish white.

CORE—Small and close.

SEEDS—Large and of dark brown color.

STEM—Variable, most generally short and fleshy, but at other times long and slender; specimens on the same tree often varying exceedingly in this particular as well as in their size; it is inserted in a wide and deep cavity.

EYE—Open, small, and sunk in a deep and rather narrow cavity.

SEASON—From November to February and March.

GROWTH—Erect, making a handsome tree, rather moderate, a fair, though not profuse, but regular bearer.

This variety deserves a more extensive dissemination than it now has; it is a beautiful as well as very delicious fruit, much resembling the celebrated Newtown Pippin, having a more tender flesh, being usually of larger size, but not quite as rich in flavor. In order to have the fruit in perfection the tree should be planted in gravelly loam, and be well manured.

PEARS.

DOYENNE D'ÉTE—Nois Bon Jard, Downing, &c.

SYNONYMS.

Summer Doyenné—Thomas.

Doyenné dé Juiellet—Thompson.

SIZE—Medium, being about two inches long, by a line or two less than that in breadth.

FORM—Roundish obovate, and somewhat turbinate, also slightly obtuse at the stem end.

EXTERIOR COLOR—Clear and beautiful yellow, with a brilliantly bright red cheek, and dotted with light russet specks over its whole surface.

TEXTURE—Melting, buttery, and well supplied with delicious juice.

FLAVOR—Richly saccharine, with a pleasant and sprightly perfume.

COLOR OF FLESH—Yellowish white.

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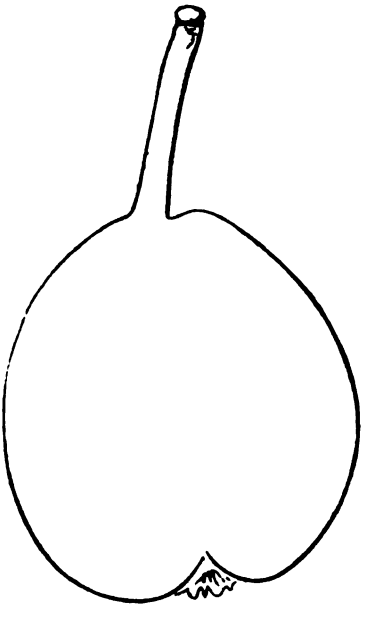

Doyenne D'Été.

Core—Small and compact.

Seeds—Small, rather flat, and dark brown.

Stem—Long, usually about the length of the outline, rather stout, somewhat fleshy at its insertion into the fruit, which is without depression.

Eye—Small, set in a shallow basin, with the segments of the calyx short and stiff.

Season—From the first to the fifteenth of August.

Growth and Color of Wood—Vigorous and erect as well as hardy, and an abundant bearer. The color of the young wood is of a lightish olive with brown specks on it; the old wood, grayish brown.

This variety deserves further extension than it now has; it has fruited in the vicinity of Albany about four seasons, and has proved itself to be a hardy, prolific and very delicious fruit, ripening in the summers of 1848 and 1849, from the 3d to the 10th of August. Summer fruits of good character being somewhat limited in number, and but few varieties having been recommended in our former lists, we take pleasure in directing the attention of growers to the one now under consideration. It originated near Nantes in France, was brought into notice in that country by M. Noisette, in 1830, and was introduced into this country by Mr. Kenrick, of Boston, about 1837. A beautiful, colored plate, as well as a minute description of it, will be found in the seventh No. of Hovey's Fruits of America.

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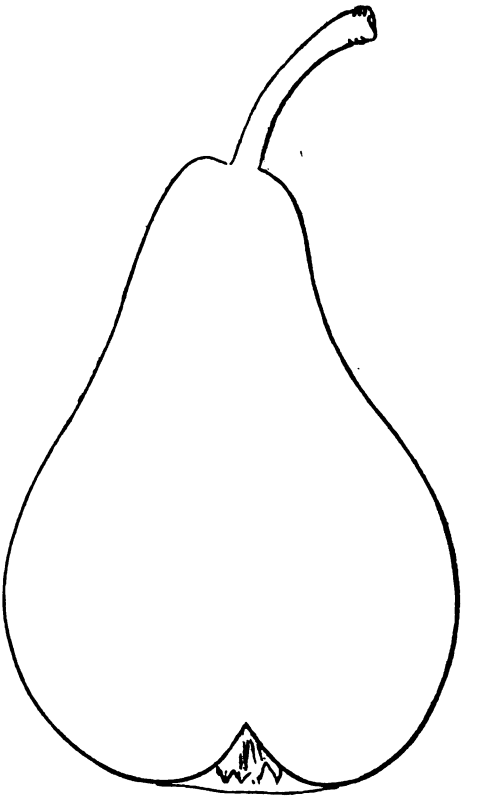

ANDREWS.—Manning, Kenrick, Downing, &c.

SYNONYMS.

Amory,

Gibson.

SIZE—Large.

FORM—Pyriform and occasionally inclined to one side, usually the form of our outline.

EXTERIOR COLOR—Dull yellowish green, with a brownish red cheek on the exposed side, and a small number of greyish dots sprinkled over the surface.

TEXTURE—Melting, fine grained and very juicy.

FLAVOR—Vinous, aromatic and very agreeable.

COLOR of FLESH—Greenish white.

CORE—Of moderate size and compact.

SEEDS—Dark brown and plump.

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Stem—Somewhat stout, curved to one side and set into the fruit with very slight depression.

Eye—Of moderate size, open, and usually set in a shallow basin; but it is quite variable in this respect, as the basin is frequently of considerable depth.

Growth and Color of Wood.—A free grower, an abundant, uniform and early bearer, quite hardy and free from diseases. The young wood is of a light greenish olive color.

Season.—From the middle of September to about the tenth of October.

This fine native variety deserves to be placed on our select list, for notwithstanding it is not always fully entitled—from its flavor—to be placed in the front rank, it is so uniformly good—when well cultivated—that we are induced to overlook this slight deviation from our usual standard, and recommend it for general cultivation; not only for this reason, but because it is uniformly an abundant and an early bearer, of prepossessing appearance, and very hardy. It requires good cultivation however, and a gravelly loamy soil; with this attention it will well repay cultivators of it. It originated in the vicinity of Dorchester, Mass., and was first introduced by J. Andrews, Esq., of Boston, whose name it bears.

URBANISTE.—Thompson, Lindley, Downing, &c.

Synonyms.

Beurré Picquery.
Beurré de Roi.

Size—From medium to large, being usually about two and eight-tenth inches broad, by about the same in depth.

Form—Obtuse obovate, and uniformly regular.

Exterior color—Pale yellowish green, with a few patches and dashes of russet, also a number of grayish dots, and on the exposed side dashes of pale rosy red.

Texture—Fine grained, buttery, rich and melting, also supplied with an abundance of rich, delicious juice.

Flavor—Richly perfumed, and sprightly vinous sub-acid.

Color of Flesh—Yellowish white.

Core—Large, and somewhat gritty.

Seeds—Medium, and of dark brown color.

Stem—About an inch in length, stout, fleshy, and inserted in a moderately deep and even cavity.

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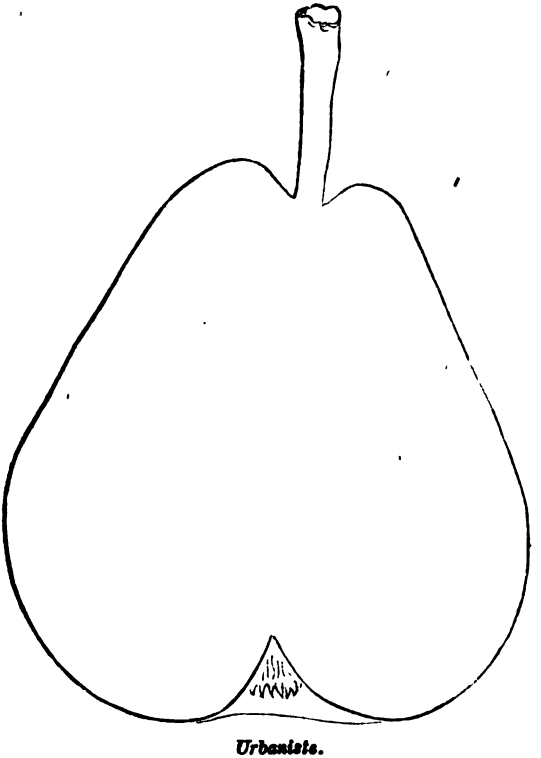

Urbaniste.

EYE—Small, closed, and set in a moderately deep, distinct, and even basin.

GROWTH.—Moderate, hardy and healthy; it is also a profuse and regular bearer, though rather tardy in coming into a bearing state.

COLOR OF WOOD—Grayish yellow, and upright, forming a beautiful tree.

SEASON—October and November, best if ripened in the house.

The Urbaniste is one of the most valuable varieties for general dissemination which the committee have recommended to be added to the select list. It does not come into a bearing state as early as a large number of the new varieties, but when it begins to bear, it does so regularly, and then produces large crops of fair and beautiful, as well as delicious fruit, much resembling in appearance and character, the White Doyenne, though not possessing the richly saccharine flavor of that variety, but having more of a vinous sub-acid character. It is of Femish origin, having been produced from seed by the Count de Colonna, of Malines. It was first grown in this country in 1823, by Mr. Lowell, of

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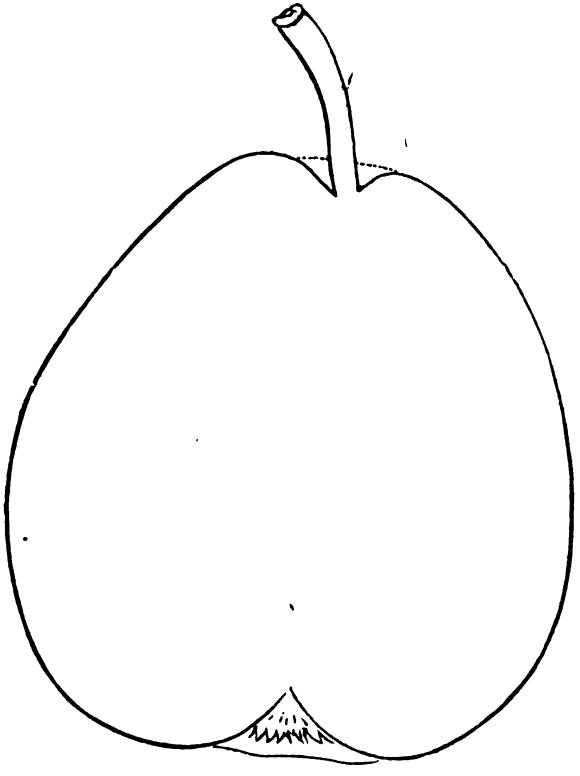
Boston, who received scions from Mr. Knight, of the London Horticultural Society, which society had the year previous received them from its originator.



FLEMISH BEAUTY.—Lindley, Thomson, Downing, Hovey, &c.

SYNONYMS.

Beurre Spence, (*V. Mons.*)	*Imperatrice de France.*
La Belle of Flanders,	*Josephine*, } incorrectly
Belle of Flanders,	*Fondante du Bois*, } of some.
Bosch,	*Boschpeer*,
Bosch Sire,	*Bosch Nouvelle*,
Brilliant,	*Barnard*—of some.

Size—Large, often three inches broad, by three and a quarter in depth.

Form—Obtuse obovate.

Exterior Color—A ground of dull pale yellow, slightly rough, is partially covered with dashes and patches of a brownish russet, and on

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the exposed side is beautifully shaded with a rich deep crimson, slightly tinctured with green; it is also dotted with numerous russet specks.

Texture—Slightly coarse grained, but melting, and well supplied with rich and delicious juice.

Flavor—Richly saccharine, accompanied by a peculiarly pleasant musky aroma; it is sometimes however rather deficient in this agreeable addition to its other good qualities.

Color of Flesh—Yellowish white.

Core—Rather large.

Seeds—Small and light brown.

Stem—Of medium length, from an inch to an inch and a half, frequently rather stout, inserted in a deep, circular and narrow cavity.

Eye—Small, open, and set in a small shallow basin.

Growth—Thrifty, very productive—after five or six years old—and hardy.

Color of Wood—Dark reddish brown, with numerous whitish gray specks, and upright, forming a beautiful tree.

Season—From the twenty-fifth of September to the middle of October, must be gathered when hard, and ripened in the house, or it will be deficient in flavor.

The Flemish beauty is certainly one of the most beautiful, and we do not think it saying too much, when we say it is also one of the best pears we have. It is hardy, very uniformly productive, after it has attained an age of five or six years, and vigorous in its growth, forming a beautiful tree; the fruit also hangs singly, as if thinned out, and when the tree is well cultivated in suitable soil, it often attains to a very large size, of delicious character. We therefore, without any hesitation, recommend it for general dissemination. It is of Flemish origin, and as it conforms to the character, growth and appearance of the Beurré Spence, as given by Dr. Van Mons, its originator, is probably the same. At any rate, no fruits at all analogous to Dr. Van Mons' description of the Buerré Spence has as yet been imported into the country, except the Flemish Beauty, and *it* has been received from nearly every continental or English nurseryman for the B. Spence. We therefore think ourselves fully warranted in inserting the B. Spence as a synonym of this fruit.

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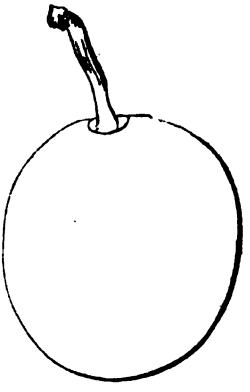
PLUMS



MADISON PLUM.—Horticulturist, Nov., 1849.

Size—Medium; usually an inch and four-tenths in depth, by an inch and three-tenths in breadth.

Form—Roundish oval.

Exterior Color—Light golden orange, slightly tinctured with a greenish shade, and faintly marked with pale yellow; the exposed side is beautifully blotched and spotted, with deep, rich, carmine-lake, and the whole surface is faintly suffused with a delicate bloom. Such specimens as are shaded from the rays of the sun, have very few, if any, of these blotches or spots.

Color of Flesh—Deep golden yellow.

Texture—Somewhat firm, though not in the least tough; but on the contrary, rather melting, and well supplied with rich delicious juice.

Flavor—Richly saccharine, and very pleasant.

Stone—Irregularly oval, rather pointed, small, and non-adherent to the flesh.

Stem—About three-fourths of an inch in length, not very stout, curved to one side, and inserted in a regular, moderately deep depression, a little on one side of the base of the fruit.

Suture—Quite shallow, frequently not more than a line, but uniformly visible and extending from apex to base.

Color of Wood—The young summer shoots are green; the old wood, greenish brown, and free from down.

Growth—The tree is upright and rather spreading, as well as quite thrifty in its growth, and also perfectly hardy; the stems and branches are somewhat slender; the leaves are of a light green color, slightly downy,

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nearly oval—accuminate, as well as obtuse—serrate, and over three inches long, exclusive of the foot-stalks, which are short, and a line or two over half an inch in length.

SEASON—From the first to about the twentieth of October.

Notwithstanding we have heretofore refrained from recommending new varieties of fruits for general dissemination, until they had been tested in several localities, still we have concluded, in this instance, to break in upon our rule, and recommend the Madison Plum to the agriculturists of our State. It is an accidental seedling variety, found in the celebrated plum garden of Isaac Dennison, Esq., of Albany—from which garden many valuable standard varieties have been disseminated—and was first introduced to public notice through the columns of the Horticulturist, by the writer of this notice, in the fifth number of the fourth volume of that valuable periodical. Although the Madison, is fully equal in every particular to a large number of the varieties of the plum (and far superior to many) which are now placed among those of first character, still its principal recommendation to public favor must be, the late period of the season at which it comes to maturity, its very prolific habit and its ability to withstand our severe and changeable winters without injury. The parent tree is about six years old, and has borne fruit two seasons, in 1849 about three bushels, many of which hung on the tree without decaying, shrivelling, or losing their flavor, until the tenth of November. It is probably a hybrid between the Bleecker Gage and the Blue Gage, one of the former of which varieties is growing immediately adjoining it, and several of the latter of which surrounds it on every side.

PEACHES.

OLDMIXON FREESTONE—Downing, &c.

SIZE—Large.

FORM—Nearly globular and swollen on one side.

EXTERIOR COLOR—Pale yellowish white, clouded with red, the exposed side is covered with a deep rich red.

TEXTURE—Tender, rich, delicious and juicy.

COLOR OF FLESH—Greenish white, but generally white red around the stone.

FLAVOR—Peculiarly rich and vinous, as well as saccharine.

STONE—Non-adherent to the flesh.

SUTURE—Only across the apex of the fruit.

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Hollow for Stem—The stem is inserted in a very shallow cavity.

Leaf Glands—Globose.

Flowers—Small.

Growth—Vigorous, hardy and a good bearer.

Season—Early in September.

This favorite variety is well worthy a place on our select list, it is admirably adapted to all parts of the State, particularly on account of its hardy character. It is an American seedling.

CRAWFORD'S LATE MELOCOTON—Downing, &c.

SYNONYM.

Crawford's Superb Malacatune.

Size—Very large; uniformly so.

Form—Globular.

Exterior Color—Bright and beautiful yellow, with a dark rich red on the exposed side.

Texture—Melting, rich and well supplied with very pleasant juice.

Color of Flesh—Yellow, but red around the stone.

Flavor—Very agreeable, rich and vinous.

Stone—Non-adherent to the flesh.

Suture—Rather slight, but quite distinct, however.

Hollow for Stem—The stem is inserted in a shallow cavity.

Leaf Glands—The leaf glands are globose.

Flowers—The flowers are small.

Growth—The tree is vigorous, hardy, and very productive.

Season—From the twentieth to the last of September and early in October.

This superb peach was originated by the same gentleman—William Crawford, Esq., of New Jersey—who originated the Crawford's Early, which was recommended in a former report of this committee. It is one of the most delicious and valuable of the yellow-fleshed varieties, (only being somewhat deficient in flavor during short seasons, or in the colder latitudes of the State,) and should be found in the most limited collections. It is always large, very beautiful in appearance, and in great demand in the market. We therefore recommend it with great confidence to farmers and fruit growers.

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BERGEN'S YELLOW.—Downing, &c.

Size—Very large, often measuring eight or nine inches in circumference.

Form—Globular, but slightly depressed or flattened.

Exterior Color—Rich, deep orange, with occasional spots of red, and the exposed side of a deep rich red.

Texture—Melting, and well supplied with rich and delicious saccharine juice.

Color of Flesh—Dark yellow.

Flavor—Very rich and luscious.

Stone—Non-adherent to the flesh.

Suture—Well defined, and passing more than half around the fruit.

Hollow for Stem—The stem is inserted in a well defined cavity, of moderate depth.

Leaf Glands—The leaf glands are reniform.

Flowers—The flowers are small.

Growth—The tree is vigorous, hardy, and a good grower, but somewhat moderate, though a regular bearer.

Season—Early in September.

This is a variety which well deserves a place in the most limited collections It is very large, and beautiful, in appearance, as well as delicious and rich in flavor, and always commands a high price in market. It is sometimes confounded with the Yellow Rareripe, but it is easily distinguished from that variety, as it has a deeper color, a much richer flavor, ripens several days later, and, too, has different leaf glands, this having reniform, that globose glands. It is also sometimes mistaken for the Red Cheek Melocoton, but it is several days earlier than that variety, far more rich and delicious, and as in the other case, also differs in the leaf glands, those of the Melocoton being globose. It originated on Long Island.

CHERRIES.

KNIGHT'S EARLY BLACK.—Thompson, Lindley, Downing, &c.

Size—Large.

Form—Obtuse heart-shaped, but of rather irregular surface.

Exterior Color.—Very dark purple, becoming quite black when at maturity.

Texture—Tender, and well supplied with rich and pleasant juice.

Flavor—Richly saccharine and quite agreeable.

Color of Flesh—Deep purplish crimson.

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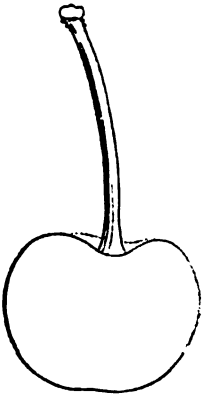

Knight's Early Black.

Stem—Of moderate length, usually about an inch and a quarter in length, moderately stout, and inserted in a cavity of considerable depth and rather open.

Season—From the tenth to the fifteenth of June, a few days before the Black Tartarian.

Growth—The tree is quite thrifty, spreading in its habit, and productive.

This delicious, large, and beautiful early cherry, was produced from seed by Mr. Knight, of London; it is a hybrid, between the Graffion and Mayduke. It somewhat resembles the Black Tartarian, but is more uneven in surface, and about ten days earlier than that celebrated variety; it also resembles the Black Eagle, but is larger, earlier and more heart-shaped than that fine variety. We recommend it as well deserving a place on the list with those heretofore recommended by us for general dissemination.

BLACK EAGLE.—Thompson, Lindley, Downing, &c.

Size—Rather below large, and above medium.

Form—Obtuse heart shaped, and rather globular.

Exterior Color—Very dark rich purple, almost black.

Texture—Tender, rich, very juicy, and delicious.

Flavor—Rich, very agreeable and distinct.

Color of Flesh—Dark purplish crimson.

Stem—About one and three quarter inches long, rather slender, and inserted in a cavity distinct, but somewhat superficial.

Season—Early in July.

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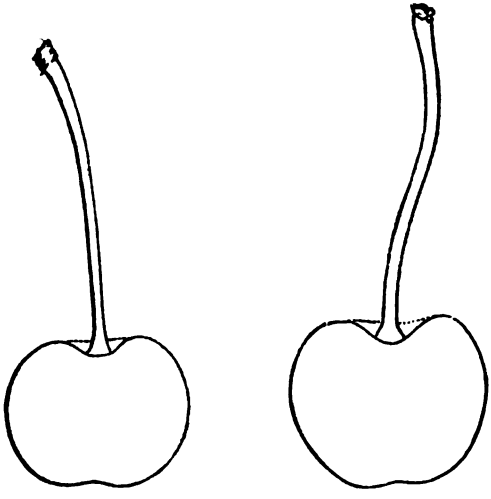

Black Eagle. *Bigarreau.*

GROWTH—The tree is thrifty in its growth, spreading in its habit, and a good bearer, bearing its fruit in twos and threes. This favorite, and very fine cherry, is an English variety, having been raised from seed in 1806 by a daughter of Mr. Knight; it well deserves a place on our select list, and we consequently recommend it for general dissemination.

GRAFFION, OR BIGARREAU.—Congress of Fruit Growers, 1848.
BIGARREAU.—Downing, Thompson, Lindley.

SYNONYMS.

Yellow Spanish,
White Bigarreau, Man. & Kenrick.
Amber, or Imperial,
Prinzessin Kirsche,
West's White Heart,
Bigarreau Gros,
Cerise Ambrée,
Bigarreau Royal,
Turkey Bigarreau,
Groote Princess,
Italian Heart,
Hollandische Grosse,
White Tartarian, incorrectly of many.

SIZE—Large, frequently more than an inch in diameter.

FORM—Regular, obtuse heart-shaped.

EXTERIOR COLOR—Beautiful clear yellowish white, very smooth and waxen like; on the exposed side is marbled and dotted with clear bright red.

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Texture—Firm and well supplied with rich and delicious juice.

Flavor—Richly saccharine and very agreeable.

Color of Flesh—Pale yellowish white.

Stem—Rather stout, about from an inch and three quarters, to two inches in length, and inserted in a wide shallow cavity.

Season—Latter part of June, and early in July.

Growth—The tree is thrifty, hardy, abundant, and an early bearer; the branches spread in a lateral direction and form a beautiful tree; the shoots are strong and rather thick.

This magnificent cherry should be in every collection. It is admirably adapted to market purposes, for, being firm in flesh, it bears carriage remarkably well, and also being of beautiful appearance and large size, it always commands a high price. It was introduced to American growers in 1808 by the late William Prince. It is sometimes confounded with the *White Bigarreau*, but may be distinguished from that variety by its *long and broad leaves*, that has *narrow waved leaves*: it is also much more hardy, vigorous, and productive.

GOOSEBERRIES.

WOODWARD'S WHITESMITH.

This is a large and beautiful, as well as valuable variety. It is usually over an inch in length, roundish oblong in form, white and semi-transparent in color, downy or hairy on its surface, very rich, pleasant and agreeable in its flavor, and erect in its growth.

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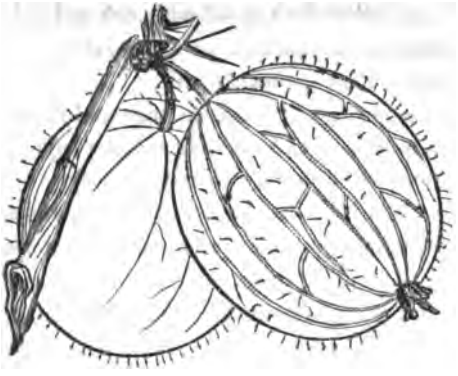

CROWN BOB.

SYNONYM.

Melling's Crown Bob.

This is also a large and beautiful, as well as rich and delicious variety. It is rather larger than the above, being usually over an inch and a quarter in length, roundish oval in form, red in color, downy or hairy on its surface, rich, and very agreeable in flavor, and spreading or drooping in its growth.

GREEN WALNUT.

This is another large and delicious, as well as rich and beautiful berry. It is not quite as large as the last one described, but is full as good in quality; is obovate in form, green in color, smooth on its surface, rich, delicious and agreeable in its flavor, and spreading in its growth.

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COMPTON'S SHEBA QUEEN.

This is decidedly the richest and most delicious, as well as one of the most beautiful berries we have; it is larger in size than either of the above, obovate in form, white and clear in color, downy or hairy on its surface, very pleasant, rich and luscious in its flavor, and erect in its growth.

The gooseberry requires a deep, rich, and well drained, as well as cool soil. Before setting out the plants, the soil shold be well manured, and deeply trenched, then cover the earth round and under them with salt meadow hay; this keeps the roots cool, and gives a saline atmosphere, which seems to destroy the germ of the insect which is by some supposed to cause the mildew.

RASPBERRIES.

FASTOLFF.

This new, and beautiful, as well as large, and delicious raspberry, is well worthy a place in our list. In size it is very large, with large grains, in form nearly globular, but somewhat obtusely conical, in color bright, rich, purplish red, in flavor rich and delicious; its flesh is tender, very juicy, and agreeable; its time of ripening about the tenth of July, and continuing in succession some ten or twelve days; its growth is upright, stout, with strong spines, and branching, it is also more hardy than many other varieties, and a very prolific bearer. It was introduced to public notice by the Messrs. Youell, nurserymen, of England. When first discovered it was growing in an old laurel hedge near Fastolff castle, from whence it gets its name. The only objection to it as a market fruit is, that being of tender flesh, it is not so well able to stand land carriage as some other varieties.

FRANCONIA.

This is probably the hardiest valuable raspberry now under cultivation. In size it is very large, in form obtusely conical, in color dark, purplish red, in flavor a rich, delicious and agreeable sub-acid, (rather more tart than the Red Antwerp;) its flesh is firm, its time of ripening, from about the twentieth of July to the tenth of August; its growth is strong and spreading; its wood is of a light brown color, with occasional stout spines upon it; it is also very hardy, and an abundant bearer, and well deserves recommendation for general dissemination, as in addition to its other good qualities, it is of firm flesh, enduring land transportation remarkably well, which renders it valuable as a market variety.

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Franconia.

YELLOW ANTWERP.

SYNONYMS.

White Antwerp,
Double bearing Antwerp.

This favorite, delicious, and most beautiful variety ought to be in every collection. In size it is large, in form conical, in color pale yellow, in flavor sweet and delicious, in texture of flesh not quite as firm as the Franconia, but more so than the Fastolff; in time of ripening about

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the tenth of July; in growth it is vigorous, stout, and of yellowish color, well covered with spines; it is also a prolific bearer, but requires slight protection during the winter months, for it is not able to withstand the vicissitudes of our variable climate without this precaution. It always commands a high price in the market, and is on this account a profitable variety for general dissemination.

Yellow Antwerp.

CURRANTS.

KNIGHT'S SWEET RED.

This variety is the production of Mr. Knight, and well deserves general dissemination. Its berries are quite large, of a beautiful bright red color, and of a very pleasant sub-acid flavor, much less acid than any other red variety, but not by any means entirely sweet; its bunches or clusters are also quite large; it is also a hardy and prolific variety.

WHITE GRAPE.

The berries of this new variety are of much larger size than those of any other white currant. They are of a beautiful greenish white color, and of a pleasant and agreeable flavor; the bunches are also long, and the plant an abundant bearer, and well deserves general dissemination.

MAY'S VICTORIA.

This new variety, raised from seed by Mr. Wm. May, of Yorkshire, is fully entitled to general dissemination. Its berries are quite large, of a

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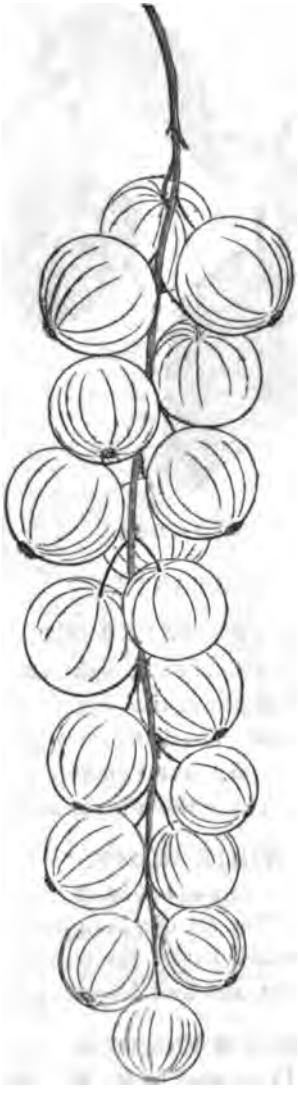
bright, and rich red color, of a much more acid flavor than the Red Dutch, but notwithstanding this, the flavor is of an agreeable character; its bunches are very large, often measuring full six inches in length; the plant is also a hardy, vigorous, and very prolific bearer, but what must be its principal recommendation to growers for market purposes is the fact that the fruit hangs on the bushes without shrivelling or decaying until August and September.



May's Victoria.

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TREASURER'S REPORT.

Dr. *Luther Tucker, Treasurer, in account with New York State Ag. Society.* Cr.

1849.			1849.			
Jan. 20.	To balance from ex-treasurer,.....	$433 55	By cash paid	Premiums,	(A.).....	$4,397 66
	Cash received at annual meeting,..	97 00		Salaries,	(B.).....	1,410 88
	Cash from sale of mortgage,.....	2,000 00		Debts of 1848,	(C.).....	2,037 15
	Interest on funds invested,.....	350 00		Library and Museum,	(D.).....	329 26
	Annual appropriation from State,...	700 00		State Fair,	(E.).....	792 79
	Cash of Comp'r for repairs of rooms,	83 23		Postage,	(F.).....	147 37
	Cash of do. for museum,.....	100 00		Printing and reporting,	(G.).....	270 11
	Avails of $600 note discounted,...	593 61		Repairs of Ag. rooms,	(H.).....	31 84
	Cash of J. A. Taintor, Esq., Hartford, Ct.,.....	100 00		Incidental expenses,	(I.).....	409 05
	Cash repaid by M. Adams, vouch'r 14,	5 00		Miscellaneous items,	(J.).....	747 03
	Cash for Transactions sold,.....	26 50				$10,573 14
	Cash received at State Fair,.....	8,144 55	By balance, Jan. 16, 1850,.....			2,101 30
	Sundry memberships,.....	6 00				$12,674 44
	Cash repaid by Joseph Alleyn,.....	35 00				
		$12,674 44				

Permanent Funds.

Mohawk and Hudson Railroad bonds, 7 per cent. interest,.....	$3,000
Bonds and mortgages, 7 per cent. interest,.....	4,000
	$7,000

Albany, January 16, 1850.

We certify that we have carefully examined and compared the above account with the accompanying vouchers, and that the same is in all respects just and true.
Albany, Jan. 17, 1850.

JOHN A. KING, *President*,
B. P. JOHNSON, *Secretary*.

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(A.)—PREMIUMS PAID.

1849.				
Jan. 20.	Rapalje & Briggs, on ag. implements, 1848,..	1	$30	00
	Ira Apthorp, on wheat,.....	2	15	00
	John Rowe, on roots,.....	3	8	00
	H. C. Tuthill, on butter, ...	4	10	00
	Chas. Lee, on apples,.....	12	5	00
	B. B. Kirtland, on farm, ...	13	20	00
	M. Adams, on barley,.....	14	20	00
	Wm. Newcomb, on potatoes,.....	15	10	00
	Benj. Enos, on corn, barley and oats,.....	16	25	00
24	J. M. Sherwood, on sheep, 1848,.....	19	20	00
26	Asa Fitch, on acc't of survey,.....	20	75	00
Feb. 3	E. M. Bradley, on oats and barley,.....	23	25	00
9	E. C. Bliss, on grains, seeds, &c.,.....	32	25	00
	L. T. Marshall, on Indian corn, ...	33	5	00
	S. H. Church, on potatoes,.....	34	15	00
	A. Miller, on wheat,.....	35	20	00
	D. Jenison, on oats,.....	39	10	00
	R. Lovett, silver medals for 1848,.....	40	23	20
	Ball, Tompkins & Black, for gold medals, for 1848,.....	41	13	00
	B. P. Johnson, for premium expenses,.....	44	6	76
	W. D. Osborn, on experiments.....	47	20	00
28	Levi T. Marshall, on Indian corn,.....	48	3	00
Mar. 1	Jos. Hastings, on ruta bagas,.....	49	10	00
	P. Crispell, Jr., on Indian corn,.....	50	20	00
8	Benj. Hodge, on pears, 1848,.....	51	15	00
	B. P. Johnson, premium expenses,.....	54		75
10	C. Martin, on flowers, 1848,.....	57	2	00
	Isaac Allen, on linen, 1848,.....	58	4	00
20	D. S. Curtis, on essay, ...	59	50	00
April 19	H. T. E. Foster, on farm,.....	66	50	00
	John Holbert, on butter dairy,.....	66	50	00
	do butter, Jan. 1849,.....	66	15	00
19	do do	66	35	00
	E. C. Bliss, on farm, ...	66	30	00
	McCulloch & Kirtland, on farm,.....	66	20	00
27	Silas M. Burroughs, on horse, 1848, ...	67	5	00
May 17	Wm. Risley, on carrots,.....	73	8	00
June 15	J. H. Salisbury, on essay,.....	81	75	00
July 19	do do	85	100	00
21	Geo. A. Moore, on cheese, 1848,.....	86	25	00
Aug. 9	Geo. Waterman, lettering medals,.....	94	1	00
11	J. H. Salisbury, on essay,.....	96	125	00
13	R. Dorman, on oxen, 1848,.....	97	5	00
16	W. C. Little, books for premiums,.....	101	3	75
24	Rob't Lovett, for medals,.....	102	113	00
Sept. 14	J. Van Ornem & Co., on hay forks, ...	105	2	00
	C. C. Cook, on cattle,.....	106	15	00
	R. H. Van Rensselaer, on cattle,.....	107	30	00

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Sept. 14	John Bryden, on oxen,		108	15 00
	H. H. Eastman, on steers,		109	10 00
	H. H. Sherrill, on steers,		110	8 00
	Leonidas Doty, on fat cattle,		111	25 00
	Hiram Sheldon, on cattle,		112	18 00
	Israel Boyes, 20 yoke oxen,		113	50 00
	A. L. Bingham, Hartford prize for sheep,		114	100 00
	Z. B. Wakeman, on sheep,		115	54 00
	Israel Boyes, on oxen,		116	12 00
	Nottingham & Allen, on horses,		117	12 00
	E. Morrison,	do	118	12 00
	Wm. W. Huff,	do	119	20 00
	R. R. Buck,	do	120	20 00
	E. Moore,	do	121	10 00
	Elias Thomas,	do	122	15 00
	Cornelius Schobey,	do	123	12 00
	David Wemple,	do	124	12 00
	H. Otis,	do	125	5 00
	John J. Boshart,	do	126	10 00
	John Muir, Sr.,	do	127	5 00
	B. H. Streeter, on steers,		128	10 00
	M. M. Darte, on sheep,		129	18 00
	C. M. Hudson, do		130	10 00
	John Reeves, on cattle,		131	11 00
	Thos. Bell, do		132	15 00
	S. S. Vaughn, on horses,		133	8 00
	A. R. Clark, do		134	12 00
	S. P. Chapman, on cattle,		135	57 00
	P. B. Williams, do		136	8 00
	L. G. Morris, do		137	20 00
	A. Ayrault, do		138	48 00
	Henry Gould, on horses,		139	15 00
	Wm. Robson, on sheep,		140	24 00
	J. Cheeseborough, on poultry,		141	3 00
	Paris Barber, on ox cart,		142	3 00
	E. Davis, on ploughing,		143	10 00
	Jno. J. Boshart, on poultry,		144	3 00
	Noah M. Coburn, on silk,		145	3 00
	R. G. Arthur, on horse,		146	5 00
	R. D. Brown, on cheese,		147	15 00
	Alex. Thompson, on flowers,		148	6 00
	Mrs. E. T. T. Martin, do		148	9 00
	Mrs. David Thomas, do		148	3 00
	R J. Ransom, on sheep,		149	18 00
	J. Haswell, on sheep,		150	5 00
	G. W. Henry, on flannel,		151	6 00
	Jane M. Lathrop, on hearth rug,		152	3 00
	H. Sheldon,	do	153	5 00
	L. Raymond, on cheese press,		154	2 00
	Francis Rotch, on cattle,		155	20 00
	Chas. Clow, on grain cradle,		156	2 00
	Nelson Van Ness, on butter and linen,		157	29 00
	W. E. Tallman, on carpet,		158	10 00

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Sept. 14	J. Clapper, on fanning mill,.....	159	5 00
	H. N. Washbon, on swine,.....	160	10 00
	E. R. Dix, on churn,.....	161	2 00
	E. J. Burrall, on implements,.....	162	20 00
	Miss E. Cheeseborough, on needlework,.....	163	3 00
	W. Fuller, on cattle,.....	164	20 00
	H. Clark, on linen,.....	165	6 00
	C. Lawrence, on flannels,.....	166	2 00
	Wm. Wheeler, on stoves,.....	167	5 00
	Jno. F. Clark, on quilt,.....	168	3 00
	James P. Fogg, on beans,.....	169	3 00
	E. R. Dix, on oats and barley,.....	170	10 00
	R. H. Chase, on horse rake,.....	171	2 00
	W. R. Coppock, on grapes,.....	172	5 00
	M. Bingham, on foreign stock, ...	173	15 00
	T. Judson, on wheat,.....	174	5 00
	Calvin Blodgett, on foreign stock,.....	175	8 00
	J. B. Burnett, on cattle, ...	177	5 00
	E. P. Beck, on do	178	30 00
	C. Merriam, do	179	3 00
	H. Clift, do	180	5 00
	H. Bundy, do	181	8 00
	L. S. Bundy, do	182	3 00
	A. Nowlen, do	183	10 00
	C. Leach, do	184	15 00
	J. Barber, do	185	10 00
	E. P. Beck, do	186	20 00
	R. M. Remington, do	187	18 00
	Geo. Miller, on sheep,.....	188	20 00
	A. Decker, on horses,.....	189	8 00
	S. Schermerhorn, on horses, ...	190	8 00
	Wm. Fergerson, "	191	20 00
	Nottingham & Allen, "	192	20 00
	Jno. D. Spinner, "	193	8 00
	A. G. Percy, on cattle,.....	194	10 00
	N. R. Williams, on horses,.....	195	5 00
	D. S. Curtis, on sheep,.....	196	8 00
	R. C. Gapper, on foreign stock,.....	197	30 00
	E. Sheldon, on cattle,.....	198	58 00
	C. P. Hudson, on sheep,.....	199	8 00
	Jos. Ashford, on foreign stock,.....	200	15 00
	M. Boomer, on horses,.....	201	4 00
	E. R. Dix, on sheep,.....	202	5 00
	L. G. Morris, on cattle,.....	203	44 00
	Jas. Bicknell, on sheep,.....	204	8 00
	Wm. H. Sotham, on cattle,.....	205	78 00
	Robt. Allen, "	206	10 00
	Thos. L. Clark, on horses,.....	207	10 00
	Randall & Milliman, on sheep.....	208	15 00
	C. P. Hudson, on poultry,.....	209	3 00
	Jeremiah Fink, on cultivator,.....	210	3 00
	Caroline Tyce, on rag-carpet,.....	211	4 00
	W. G. Brainerd, on plowing,.....	212	8 00

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Sept. 14.	A. Lewis, on horses,	213	8 00
	C. W. Taylor, on sugar,	214	5 00
	S. F. Church, on sheep,	215	33 00
	G. W. Henry, on domestic manufactures,	216	6 00
	J. W. Collins, on blankets,	217	4 00
	Sally Goodell, on carpets,	218	3 00
	John B. Miller, on horses,	219	10 00
	S. B. Crocker, on sheep,	220	26 00
	L. D. Harlan, on foreign stock,	221	20 00
	A. Butler, on horses,	222	15 00
	Hannah Earll, on needlework,	223	2 00
	John M. Sherwood, on cattle and sheep,	224	97 00
	A. Goodwin, on grain bags,	225	1 00
	Ambrose Stevens, on cattle,	226	43 00
	Lewis F. Allen, on cattle and sheep,	227	73 00
	Catharine McKnight, on domestic manuf.,	228	8 00
	H. N. Washbon, on cattle,	229	68 00
	J. N. Blakeslee, on cattle and sheep,	230	23 00
	N. M. Colburn, on blankets,	231	2 00
	S. W. Abbott, on Dom. Manuf.,	232	5 00
	S. S. Severance, on yarn,	233	1 00
	Chester Clark, on flannel,	234	4 00
	Jno. F. Clark, on butter,	235	5 00
	H. Morrison, on potatoes,	236	3 00
	E. R. Nichols, on swine,	237	3 00
	L. G. Bingham, on foreign stock,	238	65 00
	C. F. Crossman, on vegetables,	239	27 00
	A. & N. Palmer, on drawings,	240	2 00
	Rapelje & Briggs, on implements	241	32 00
	W. Swail, on sheep,	242	20 00
	John Munser, on cattle,	243	3 00
	N. B. Van Slike, on horses,	244	5 00
	S. R. Kinck, on needlework,	245	3 00
	D. S. Earll, on cattle,	246	50 00
	S. Beavell, on needlework,	247	1 00
	M. Le Couteulx, on flowers,	248	3 00
	Moses Cherry, on harness,	249	3 00
22.	J. Hutchinson, on silk,	254	8 00
28.	H. Wendell, on fruits and flowers,	255	9 00
Oct. 1.	Hovey & Co., books for premiums,	257	24 00
	Jas. Wilson, on flowers,	258	26 00
	Emeline F. Wagner, on needlework,	260	3 00
	M. M. Chase, "	261	3 00
	H. B. Lawton, on stockings,	262	2 00
	Jane McElroy, on needlework,	263	2 00
	P. Carter, on cheese,	264	10 00
	T. W. Wood, on needlework,	265	3 00
	A. L. Bingham, on shepherd's dog,	266	5 00
	Mary Gildersleeve, on needlework,	267	2 00
	D. C. Howe, on cattle,	268	10 00
	Newton & Hotchkiss, for silver ware,	269	21 00
	" " lettering premiums,	275	1 00
	W. C. Little, books for premiums,	276	10 50

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Oct.	1.	Derby, Miller & Co., books for premiums,	277	19 20
		E. C. Platt, on poultry,	280	3 00
	6.	Rufus Cossitt, on swine,	282	10 00
		Davis Cossitt, on poultry,	283	3 00
		B. Williams, on swine,	284	5 00
	8.	Caroline Hammond, on needlework,	285	3 00
		S. Brownell, on flax seed,	286	2 00
		Luman Shepherd, on sugar, &c.,	287	9 00
		Mary A. Voorhees, on needlework,	288	6 00
		H. G. Dickinson, on fruit, 1848,	289	3 00
		Benj. Hodge, "	290	13 00
		H. G. Dickinson, " 1849,	291	2 00
	18.	Robt. Rome, on cattle,	292	56 00
		Thos. Terry, on sheep,	293	23 00
	19.	N. Culver, on vegetables,	296	14 00
	20.	E. R. Dix, on cultivator,	298	3 00
		John E. Gavit, for diplomas,	299	24 00
	22.	Aaron Goodwin, on honey, &c.,	300	7 00
		Mrs. W. J. Harrell, on dom. manufactures,	301	17 00
		Mrs. H. S. Lansing, on needlework,	302	3 00
	23.	J. Denniston, on fruit,	303	3 00
		Wm. Baker, on dom. goods,	304	12 00
	24.	J. C. Hastings, on fruit,	305	10 00
	25.	Henry Weir, on dom. goods,	306	7 00
		Mrs. J. T. Van Namee, on dom. goods,	307	4 00
		Wm. Newcomb, on flowers,	308	12 00
	26.	Mrs. O. S. Gillet, on needlework,	309	3 00
		John Legg, on horses,	310	6 00
	29.	E. J. Smith, on side hill plow,	312	8 00
	31.	John Shattuck, on butter,	315	15 00
		Franklin Bowen, on horses,	316	10 00
		Franklin Thayer, on swine,	317	8 00
Nov.	3.	E. P. Prentice, on cattle,	320	105 00
		Richard Cheney, on vegetables,	322	2 00
		C. M. Burnett, on needlework,	323	3 00
	5.	J. W. Seward, on vegetables,	324	3 00
		Chas. Wilson, on painting, 1848,	325	10 00
		Jos. Hall, on implements, "	326	15 00
	6.	Sarah A. Alderman, on needlework,	329	2 00
	7.	E. H. Pease & Co., books for premiums,	336	50 50
		T. Cook, Jr., on needlework,	337	3 00
		L. T. Marshall, on dom. goods,	339	4 00
	8.	Horace Clapp, on butter,	340	15 00
	10.	Peter Michael, on sugar,	341	10 00
	12.	Alonzo Howland, on needlework,	342	3 00
	14.	C. H. Blodgett, on horses,	343	20 00
		Mrs. A. A. Sweet, on dom. goods,	344	5 00
		Wm. J. Robb, on dom. goods,	345	4 00
		A. A. Sweet, on implements,	346	5 00
	15.	Mrs. B. R. Voorhees, on dom. goods,	347	15 00
		G. Waterman, lettering medals,	348	11 00
	16.	Lewis Eaton, on fruit, &c.,	350	4 00
	17.	Ed. Munson, on cattle,	351	15 00

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		Abram Butler, on horses,.....	352	8 00
	23	H. C. White, on implements,.....	355	2 00
		Mary F. Maybie, on bonnets,.....	356	3 00
		Saml Phillips, on plowing,.....	357	5 00
		R. Woolworth, on fruit,.....	358	2 00
	24	Rob't Lovett, for medals,.....	359	112 50
		R. Preston, on swine,.....	360	5 00
	30	Seymour & Wood, on stoves,.....	362	5 00
		Mrs. H. R. Smith, on needlework,.....	363	3 00
Dec.	1	L. B. Benton, on horse power,.....	367	5 00
	10	Josh. Beard, on linen,.....	369	2 00
	11	Emily J. Pardee, on needlework,.....	370	3 00
		J. Gilkeson, on swine,.....	371	10 00
	12	H. G. H. Hathaway, on implements,.....	372	10 00
		E. Robinson, on sheep,.....	373	10 00
	14	Elizabeth Pexton, on needlework,.....	377	3 00
	15	Mrs. E. P. Jackson, on flowers,.....	379	2 00
		Rapalje & Briggs, on implements,.....	380	3 00
		H. N. Langworthy, fruits, &c.,.....	381	9 00
	22	J. B. Noyes, on dom. goods,.....	382	2 00
		F. C. Lawrence, do	383	2 00
	27	G. Waterman, lettering medals,.....	384	11 00
	29	C. Van Benthuysen, stamping premium books,	386	8 50
1850.				
Jan.	8	N. M. Coburn, on silk, ...	390	5 00
	14	C. S. Wilson, on fruit,.....	394	2 00
				$4,397 66

(B.)—Salaries & Travelling Expenses.

B. P. Johnson, salary as secretary, per vouchers, Nos 30, 55, 65, 68, 74, 82, 87, 103, 256, 313, 349, 364, 374, 389,.....	$1,200 00
B. P. Johnson, for travelling expenses, per vouchers Nos. 70, 75, 83, 91, 271, 297, 375,.....	110 88
B. P. Johnson, for messenger, per vouchers Nos. 88, 314, 365, ...	100 00
	$1,410 88

(C.)—Debts of 1848.

1849.				
Jan.	29	B. P. Johnson, travelling expenses,.....	9	24 25
		do incidental do	10	21 88
		Geo. Waterman, lettering plate, ...	17	17 00
	27	Jewett, Thomas & Co., printing,.....	21	71 50
Feb.	9	Joel Hall, expenses at Buffalo fair,.....	24	874 79
		John Smith, do	25	169 23

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	Insurance on tent,.....		27	16 50
	B. P. Johnson, for messenger,.....		28	50 00
	do	balance of salary,.....	29	37 00
April 11	State Bank, for discounted note,.....		60	751 00
Aug. 13	H. L. Emery, expenses, at Buffalo fair, ...		98	14 00
				$2,037 15

(D.)—LIBRARY AND MUSEUM.

1849.				
Jan. 20	F. Hautch, paper boxes for grain,.....		7	4 00
Feb. 9	Mrs. Reid, books for library,.....		26	10 00
	B. P. Johnson,	do 45, 79, 89, 73,	393	36 54
	L. Tucker,	do	95	3 00
	A. L. Harrison, binding for library,.....	327,	328	27 20
	Little & Co., books for library, ...		330	7 50
	E. H. Pease & Co., do		334	4 13
	B. P. Johnson, for museum, ...	78,	272	24 83
	H. L. Emery,	do	99	3 75
	W. P. Homer,	do	100	15 00
	D. E. Gavit,	do	104	60 00
	D. Landreth,	do	259	1 88
	D. F. Draper,	do	361	1 00
	Van Heusen & Charles, do		395	11 68
	H. W. Covert, for iron safe, ...		396	118 75
				$329 26

(E.)—EXPENSES OF STATE FAIR.

1849.				
Sept. 18	W. G. Bishop, reporting discussions,.....		250	50 00
	A. McElroy, clerk hire,.....		251	8 75
	S. Treadwell,	do	253	8 25
	W. H. Bogart,	do	311	31 25
	J. Van Etto, carriage hire,.....		270	50 00
	J. B. Bruce,	do	279	25 00
	B. P. Johnson, expenses at fair, ...		294	177 64
	J. B. Burnett,	do	318	92 00
	J. H. Colvin,	do	368	6 50
	John F. Strain, refreshments, ...		319	105 57
	C. Van Benthuysen, printing,.....		385	163 21
	do	badges,.....	388	74 62
				$792 79

(F.)—POSTAGES.

	B. P. Johnson, per vouchers 46, 53, 61, 69, 77, 84, 90, 274, 295, 331, 366, 392, ...	147 37

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(G.)—Printing and Reporting.

W. H. Bogart, reporting discussions at winter meetings,	23, 56, 64	75 00
B. P. Johnson, for advertising,	62	1 50
H. H. Van Dyck, for papers,	321	4 75
Weed, Parsons & Co., printing,	353	3 50
Ten Eyck & Co do and papers,	354	51 61
C. Van Benthuysen, do and binding,	387	133 75
		$270 11

(H.)—Repairs of Rooms, &c.

S. Baker, stove pipe,	6	5 31
J. Gladding,	37	2 63
H. Colman,	38	1 75
Boardman & Van Voast,	42	14 65
B. P. Johnson,	71	7 50
		$31 84

(I.)—Incidental Expenses.

B. Coggle, services at ann. meeting,	5	3 00
W. Wall, do do	8, 36	4 25
Van Heusen & Charles, crockery,	11	1 55
A. L. Harrison, blank books,	18	50
B. P. Johnson, 43, 52, 63, 72, 76, 92, 273, 332, 376, 391,		92 22
Mary Flood, cleaning rooms,	80	3 00
Prof. Johnstone,	176, 252	250 00
Wm. Boardman, boxes,	333	10 13
E. H. Pease & Co., stationery,	335	32 65
S. Groesbeck, insurance,	338	11 25
Sundry items,		50
		$409 05

(J.)—Miscellaneous Items.

Demand against Saratoga, entered as cash, in 1848,		93 10
Jos. Alleyn's receipt, entered as cash in 1848,		35 00
Paid discounted note,	287	600 00
Nancy Van Ness, goods lost at fair,	278	5 00
Mrs. P. Clute, do	378	5 75
Counterfeit bills,		5 00
Discount on uncurrent money,		3 18
		$747 03

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COMMUNICATIONS.

The annexed article has been received from Dr. D. J. Macgowan, of Ningpo, China, on the plants yielding the fibre from which the grass cloth of China is manufactured. The article was prepared originally for the Agricultural Society of Bengal India, but the author deeming it important to this country, forwarded a copy to the Society. In a note from Dr. McG., accompanying the communication, he says, that he has forwarded seeds to the Patent office for distribution. Should they be received, they will be so disposed of as to insure a proper trial in different parts of the State, so as to ascertain whether the plants are adapted to our climate.

Notices regarding the plants yielding the fibre from which the Grass-cloth of China is manufactured. Communicated by Dr. D. J. Macgowan, *Ningpo, China.*

To James Hume, Esq., *Honorary Secretary to the Agricultural Society:*

Sir,—The inquiries you have done me the honor to propose in behalf of the Agricultural Society of Bengal, respecting the plant from which "grass-cloth" is manufactured, embrace more than can be satisfactorily answered at the present time. The subjoined account, though meagre, and in several particulars incomplete, will be found to contain much of the information you seek. It is cultivated in this vicinity, but as it is of an inferior quality, and does not flower until autumn, my description is less complete than if written in a more favored locality, or at a more advanced season of the year.

Description and history.—Grass-cloth is manufactured from the fibres of a plant, called by the Chinese *Má;* it is a generic term, under which several varieties, if not species, are included, amongst these the *Tung Má*, *Pi Má*, *Sing Má*, *Tien Má*, and others are used only as therapeutic agents. Cloth is manufactured from the *Chú Má*, *Tá Má*, *Kin Má*, *Luh Má*, *&c.* There is also a species of grass-cloth made from the *Kŏh:* all these have likewise a place in the pharmacopœia of China.

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In imitation of the native botanists from whose works this account has been mainly derived, I shall principally limit my remarks to a description of the *Chú Má*, which belongs to the natural order of *Urticeæ*—it is a *Cannabis* or hemp, but differing from *Cannabis sativa*, sufficiently to warrant another designation. Perhaps until it becomes better known it may be called *Cannabis sinensis*. It has an irregular cellular root of a yellowish-white color, which sends up annually ten to fifteen, or more stems, to the height of from 7 to 10 feet. The stems are upright, slightly fluted, pilous, and herbaceous: its leaves are on long petioles, alternate, ovate, roundish, serrate, simple; the upper surface pilous and dark green, the lower of a silvery-grey. The flowers are described as minute, numerous, of a light green color, on a catkin-like receptacle or spike. It is found at the base of hills and on dry soils, from Cochin China to the Yellow river, and from Chusan to the farthest west that researches can for the present extend, and abounds chiefly in Kiangsú, Sy, Chuen, Kongnain, Chikiang, Fuchkien, and Canton provinces. Native writers do not include the latter province as its region. It is certainly remarkable, that there is no notice of the *Má* in the work to which you refer, [Fortune's Wanderings in China,] as it is cultivated extensively in many places visited by the author, and grows even on the walls of Ningpo. The plant is mentioned in the Chinese classics, and was undoubtedly cultivated and employed by them a thousand years prior to our era. It is mentioned in the *Shú King* as an article of tribute from the central part of China in the time of Yu, B. C. 2205; doubtless it came into use in far more remote antiquity. The Chinese *Herbal* says, "its origin is unknown."

Medical properties.—The root is described by writers on materia medica as innoxious, sweet to the taste, of a cold nature, and possessed of cathartic properties. The root, seeds, and leaves are all officinal. A long list of diseases are enumerated in which the plant is efficacious, but these throw no other light on its properties than to suggest it is comparatively inert. It is partly because of its not possessing the narcotic properties of the *Cannabis sativa*, that a difference is presumed to exist between them. In this connection I may remark, that grass-cloth is superior to linen for garments in hot climates, the latter being a rapid conductor of caloric is often unsafe, the former is not so good a conductor, and therefore more suitable. This may be owing either to the fact of the former being hot-pressed in a calender by which it is rendered compact and smooth, whilst the process to which the other is subjected for the same purpose, but partially affects it, or original differences in the fibres of European and Chinese linen.

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Planting the seeds.—This takes place in May. Great care is first taken in the selection of seeds, and in the preparation of the soil. The seed should be gathered on the appearance of frost, those produced from a recent root are the best. After being dried they are stowed away in a basket or jar mixed with sand, or dry earth, others say moist earth. The jar is then covered with straw to protect the seeds from the cold, as, if exposed to its influence they yield an imperfect plant. Before planting, the seeds are tested by immersion in water, those which float are to be rejected, those at the bottom to be planted. A loose dry soil is to be selected, if near a canal or rivulet it is preferable. The ground is to be well ploughed, and broken finely, manured, and then divided into beds about eight yards long, and one wide; the beds are to be raked, and afterwards made compact with a hoe. After this it is watered and left for a night: on the following day raking up and pressing down is repeated. The beds being smooth, two or three table spoonsful of seed are mixed with a bowl of earth, and sown broadcast over half a dozen beds, then they are swept with a broom to cover the seeds. In some places the seeds are first made to sprout, and then planted in drills, which are carefully filled up. Just before the blades appear, a frame work is to be constructed over the beds, on which mats should be spread to protect them from the heat of June and July. The matting must be kept moist by day and removed at night, that the blades may receive the dew of heaven. The beds are to be constantly weeded. When the plant is about two inches high, the framework and matting may be removed. When three inches high, it should be transplanted, having been well watered the night before; the blades should be taken up separately with a portion of earth, and planted in a field far removed from mulberry trees, about four inches apart. It may form a border to the ceralia and vegetables, protecting them from the depredations of domestic animals, which all avoid the *Má*. In dry weather, the field is to be watered every three or four days, until the second decade, when it may be watered every tenth day. In November and December manure it with horse or buffalo dung, earth, straw, or any rubbish, a foot or more thick, to protect it from cold. In March rake it away and expose the plant, watering it in dry weather, and using rubbish of any kind for manure. A caution is given never to use swines' dung, as it is "saltish" and hurtful to the *Má*. In the third or fourth year, some say in the second, the plant may be cut and used.

Planting the roots.—The roots are to be cut into pieces of three or four fingers' length, and are to be planted in May, half a yard apart, and watered every three or four days. On the appearance of the blades

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use the hoe and water them; they will be mature for cutting in the second year. In the course of ten years the roots become unfruitful, the shoots may then be cut off, and if enveloped in earth, and covered with matting, can be transplanted in places 30 or 40 inches distant. The ground should be first well prepared with manure, and freely manured afterwards: the manure being half water. Here, as before, the plants should be hoed from time to time. In many cases fresh earth, pulverized bricks, ashes, &c., are used for manure. Some years the husbandman has his crop injured by worms, he needs therefore to seek for and destroy them as they appear by picking them off. It not unfrequently happens, that the crop is in some places remarkably small, and sometimes the produce is very great without assignable cause.

Cutting the Má.—It yields three crops every year. The first cutting takes place in June. Care is to be taken not to cut the young shoots, keep therefore an inch from the ground. In a month or two, the shoots are seven or eight feet high, when the second cutting takes place: do not cut the original stem. During the latter part of September, or in October, the last cutting is performed, from which the finest cloth is made: the first being inferior, coarse, and hard. After each cutting, the plant is to be covered with manure, and watered; but not day by day unless it be cloudy. At Canton the plant is pulled up by the roots every year, from which it is evident that it differs widely from the *Má* just described. Perhaps that which is produced at Canton is *Cannabis sativa.*

Peeling the Má.—On being cut, the leaves are carefully taken off with a bamboo knife, by women and children, generally on the spot. It is then taken to the house, and soaked in water for an hour, unless it is already wet by recent showers. In cold weather the water should be tepid. After this the plant is broken in the middle, by which the fibrous portion is loosened, and raised from the stalk; into the interstice thus made, the operator, generally a woman or a child, thrusts the finger nails, and separates the fibre from the centre to one extremity, and then to the other. The stripping process is very easy. It appears to be difficult to remove the fibres from the Canton *Má*, as it is soaked in water for more than 48 hours before peeling, which is done by men. They first cut off the roots, and then separating the fibre from the stalk, strip it off by drawing it over a pin, fixed in a plank. In either process half of the fibre is taken off at one stroke. The next process is scraping the hemp, to facilitate which the fibre is first soaked in water. The knife or scraper is about two inches long; its back is inserted in a handle of twice the length. This rude implement is held in the left hand, its edge which is dull, is raised a line above the index finger.

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Strips of hemp are then drawn over the blade from within outwards, and being pressed upon by the thumb, the pilous portion of one surface, and the mucilaginous part of the other are thus taken off. The hemp then "rolls up like boiled tendon;" after being wiped dry, it is exposed to the sun for a day, and then assorted, the whitest being selected for fine cloth.

Bleaching and dividing.—A partial bleaching is effected on the fibres, before they undergo further division, sometimes by boiling, and at others by pounding on a plank with a mallet. These operations are in some places repeated. After being dried in the sun, an important operation then succeeds by women and children, to whom is entrusted the tedious process of splitting the fibres, which they do with their finger nails. Expert hands are able to carry this division very far. When this process has been preceded by hatcheling, the shreds are finer and softer. The threads are formed into balls, and subjected to frequent soakings and washings. The ashes of the mulberry leaf are recommended to be put in the water with the hemp, others use lime, for a whole night. Some simply expose it to dew and sun. In rainy and cloudy weather, it should be exposed to a current of air in the house: moisture darkens it. The threads are now ready for splicing, the work of women and children, the labors of the agriculturist being concluded when the threads are rolled into balls, after being sized or stiffened with rice-water. Before the thread is ready for the weaver, the balls are steamed over the vapor of boiling water in a closed oven. They are then spread out to dry. The subsequent stages, until the cloth is removed from the loom, include nothing which interests, or at least instructs, artisans in the West.

Varieties of the Má.—The *Chú Má* is found wild, but in this state attains only three or four feet, and is seldom used except for twine. *King Má* grows nearly as high as the *Chú Má*, the fibre is separated only by rotting in water. The stalks are dipped in sulphur and employed for matches. Its flowers are yellow. Very coarse cloth and sandals are made from its fibre. The thread of this *Má* made in *Kongsi*, is said to be as fine as silk. *Tá Má* or *Hán* (dynasty) *Má*, and also called fine hemp, is likewise employed for making cloth and for ropes; its fibre is used as a support to the pith employed as candle wicks. *Luh Má* produces the hemp of which rice bags are manufactured, and also ropes. The *Tung Má* and the *Pi Má* are used for making pigments, one serving for cakes, the other for paper. The only other *M* that need be named in this list is the *Chí Má*, *Sesamum indicum*. It was brought from India in the reign of Kingti, B. C. 156. It is now found in all parts of the empire. Its seeds are used in cakes,

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and like almost every kind of *Má*, it yields oil. *Flax*—It would seem from various English and Chinese Dictionaries, that flax is found in China, but of the existence of *Linum usitatissimum*, I cannot discover the slightest evidence. It seems to have been confounded with the last named plant. The above are all the facts respecting the *Má* which I have been able to glean from native authors, the deficiency can only be supplied by personal observation. The *Chú Má* of this place can be inspected and described when in flower. This imperfect account of the plants producing the fibre from which the grass-cloth of commerce is manufactured (evidently a misnomer,) would be yet more defective were the *Kóh* plant to be wholly omitted. It is described as a creeper, which every year springs from an immense root, and grows from ten to thirty feet in length, clinging to trees when within reach. The root is purple on the outside, and white within, it is made into flour like arrow-root. I have found it an useful substitute for the *Maranta arundinacea*. Its leaves have three points, they are long, green on the face, and bright below. In August it has blended purple flowers. The fibre is strongly adherent to the stalk, and is only loosened by boiling it in water. It is then taken off with the finger nails, exposed for a long time to running water, and beaten with mallets. It undergoes the same processes as the *Má*, but seems to require more beating and boiling: wooden utensils make it dark. The *Kóh*, like the *Má*, has been manufactured from high antiquity, and is found throughout the same extensive region in which the latter abounds. The cloth made from it is *yellow*, and as fine as ordinary grass cloth, it cannot be bleached white; in summer it is much worn by respectable Chinese. The best brought to Ningpo, is called *Háinán Kóh* cloth, and is perhaps manufactured on the island of Háinán. If by the *Kunkhura* you mean the *Urtica tenacissima* of Roxburgh, it is probable that it is a different plant from either variety of the *Má*. As the hindrance to the manufacture of the former is owing to the difficulty attending the peeling of the fibre, would it not be well to treat it, as the Chinese do the *Kóh*, viz. by boiling? If the *Kunkhura* should prove useless, may not the catalogue of Dr. Wallich, which contains forty-seven species of *Urticeæ*, include the *Má*, the *Kóh*, or an available substitute? The observations of Dr. Roxburgh, on the various specimens of fibrous vegetables, the produce of India, may perhaps be consulted with advantage in connection with the Chinese account of the *Má*. Besides the enclosed, I shall only be able to send you some seeds of the *Chú Má*. There can be no doubt that if seeds of the proper kind be procured from China, the plant may be introduced into India if it be not indigenous to her soil. To secure success it

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would perhaps be well to procure them from each of the open ports of China. From Canton is exported the finest cloth manufactured in the empire. This superiority the Chinese attribute to the greater still of the Canton workmen. Foreigners have referred that fibre to two plants, *Cannabis sativa*, and *Sida tilæfolia* (Dr. Abel.)* From Shanghai is exported the fine strong fibre you have referred to, the *Urtica nivea* It was through the efforts of the H. E. I. Company of Canton, that seeds were procured and forwarded to England. By referring to the 47th page of the 72nd Vol. of the Philosophical Transactions, there will be found a paper on Chinese Hemp by Mr. Furgusson, and a notice of the experiments tried with the seeds in England, (vid. Encyc. Brittannica.) Had they possessed the hints here extracted from Chinese writers on this plant, the experiments of the gentlemen named in the above paper would probably have been more successful. Should the Society wish to pursue the subject further, some useful information may be obtained from a series of sketches, 120 in number, illustrating the culture and manufacture of grass-cloth, by Tinqua, 12 New China street, Canton, a translation of the text accompanying the drawings may be found in the Chinese Repository for May, 1847. It was the special province of Monsieur Hedde, of the late embassy from France to China, to collect facts and specimens illustrative of the agriculture and manufactures of China. The result of his observations have, I believe, been published in Paris, containing a notice of one variety of the *Má*. Osbeck, a pupil and countryman of Linnæus, and Dr. Abel, Naturalist of Lord Amherst's embassy, have noticed the *Má*. The Agricultural Society of Bengal, aiming to develope the industrial resources of a great empire, and thereby to improve its inhabitants, has a claim upon the services of all who can contribute in any manner to its objects. Allow me to assure the Society, that I shall take great pleasure in responding to any further calls you may have occasion to make.

Ningpo, June 1st, 1848.

* It has also been referred to *Corchorus capsularis*. Vide Bennett's Wanderings in N. S. Wales and China,—EDS.

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FLAX—METHOD OF CULTIVATION.

William Newcomb, Pittstown, Rensselaer County.

The importance of this crop to the farmer has but just begun to be appreciated, and as it has a few peculiarities in its culture, I shall attempt to give the results of my experience for the last sixteen years. I have been extensively engaged in the raising and managing of flax, and have drawn the following conclusions: First, the soil best adapted to its culture is a rich loam; but it will succeed well on almost any soil, except sand, provided it be high or hilly land; it will not grow well on low lands, on borders of streams or rivers; it would not probably succeed oftener than once in ten years, for causes I shall presently state. The seed being small, it must not be placed deep in the ground. I would recommend the ground to be well plowed, and thoroughly pulverized by dragging before sowing, and very lightly dragged or bushed in, after sowing. The earlier sown in the spring after the ground is fit to work, the better. One bushel of seed to the acre is the best amount of seed to ensure a good yield of seed and lint; if a less quantity of seed be sown, the quantity of seed would be increased, but the quantity of lint would be lessened, and if a little more seed be sown, the lint would be increased but the seed would be lessened. On low lands the flax is subject to mildew or rust, which is of two kinds, the red rust, which destroys both seed and lint, and the black rust, which affects the stem of the flax and destroys the lint; this is the great enemy of flax growing; but on elevated or hilly lands it is very seldom attacked with either of these kinds of rust. Flax succeeds best after corn or potatoes, or such crops as have been cultivated the previous year so as to destroy weeds. The ground cannot be too rich, yet it must not be made so by manuring the flax ground with manures filled with seeds of grass and weeds, which would spring up and destroy the crop. Therefore I would not recommend manuring the flax ground the season it is sown, except with the following stimulants and manures, to wit: to each acre of land apply one bushel plaster of Paris, one bushel of fine western salt, 1 bushel of wood ashes, 1 bushel of slaked lime, of course varying these manures according to the nature of your soil. If it be a light loam mixed with gravel or sand, leave out the lime; if it be a tenacious soil bordering on clay, or nearly so, be sure and put on the lime. The salt and ashes in the quantity mentioned are not only manures, but a preventive to the operations of the worm, which

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is often very destructive to flax. Plaster is a strong stimulant, and is invaluable on dry soils by its attractive principles for moisture. The expense of getting in a crop of flax is about the same as oats. The expense of hand pulling usually is $3 per acre; thrashing the seed and cleaning, $1 per acre; dew rotting and taking it up, $1 per acre, and dressing at the mills from $2 to $2.50 per hundred lbs. of flax. The average quantity of seed raised is 8 bushels per acre, and the average quantity of flax, 250 lbs. per acre; although this has frequently been more than doubled both in seed and lint. The average price of seed is $1.25 and average price of lint, 9½ cts. per lb.

I now state from the statistics of 1845, that the number of acres of flax sown in Rensselaer county was 1,793 acres, and the quantity of flax or lint, 282,690 lbs., an average of 150 lbs. to the acre; but that year was considered as a partial failure in the flax crops. I have raised from 10 acres up to 50 acres yearly, and in that year the yield was less than any previous or succeeding year. In 1847, I raised sixteen acres of flax, producing a little over $800 as gross receipts. From my book of that year I copy the following results of one acre I surveyed, of about the average of the field. Weight of flax and seed before thrashing, 3,848 lbs.; weight of flax after the seed was off, 2,664 lbs.; weight of flax after it was dew rotted, 2,009 lbs.; weight of lint when dressed, 348 lbs.; quantity of clean seed, 13 bushels, 1 pt., and 1½ bushels of yellow seed.

Flax sold for 10 cts. per lb., ...	$34 80
13 bushels, 1 pt. seed, 10s. per bushel, ...	16 27
1½ " yellow seed, 5s. "	78
	$51 85

Expenses of seed, interest on land, at $50 per acre, and every expense attending the flax, $14.75 This, however, is less than ordinary, as I own a mill for dressing the flax. This season one acre of flax has produced 10 bushels of seed and 548 lbs. of flax.

Water Rotting.

There are two methods of rotting flax, one by spreading it thinly and evenly on our meadows, and is called dew rotting. It is considered sufficiently rotted when, by rubbing the stem and breaking it with the hand, the hurl or lint easily separates from the woody portion of the stem. This is the common process and requires but little judgment to do it properly. The other method is, by immersing it in water, and as I have rotted by this process many hundred thousand pounds, I may be excused in being a little more particular, more especially as it requires more exercise of

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judgment, and is a process less understood, and one which much enhances the value of the lint when done. I have been offered an advance of 25 per cent. on the present price of dew rotted flax for water rotted, and, it may be asked, what better is water rotted flax than dew rotted? In answer I state that many articles manufactured from flax are required by government to be made from water rotted flax or hemp, and that the cloth and twines thus manufactured will withstand in warm climates the mildew or rotting, which dew rotted cloth is subject to. After water rotting flax, for an experiment, I have left lying on the ground spread, a few bundles for months, without injury to the flax, when dew rotted flax would have been entirely lost. In water rotting flax, it is important that the flax be entirely immersed in water and kept under by heavy weights, and secondly, when sufficiently rotted, it must not remain in the water. It is rotted much better in still water or vats, than in running streams; and I cannot perhaps do better, to give the idea of what ought to be done, than to describe my own pit, which is about 60 feet long by 20 wide and 5 feet deep, which will contain nearly 20 tons of flax in the stem, with a gate at the lower part of the pit, to draw off the water from the flax, and a gate from the pond above to fill the pit with water. The flax is first placed on poles laid on the ground, regularly as it would be in the barn, (I do not think it of any importance to stand it up,) and when the pit is filled and the weights placed on the flax, let in sufficient water to cover the flax. In warm weather from the 6th to the 10th day fermentation will have taken place and the flax will rise above the water and remain a few hours, after which it sinks and the process of rotting is then finished. But this process is retarded when new water is added, and then the only way to determine is by the stem. When the lint slips freely from the stem, by drawing it through the fingers, leaving the stem free from the fibre, it is then sufficiently rotted and the vat let off, and the flax immediately drawn out and spread on the land for drying. Of course all flax before being immersed in water must be well bound in bundles with strong bands, the size is not important, but if very large, it makes very heavy handling while wet. I have rotted in this one pit, during the summer and fall 60,000 pounds, and as I observed, the warmer the weather and the water, the sooner the flax rots; and I have had a pit of 3,000 lbs. rot in five days, and I have had, later in the season, the same quantity to remain in the water for 30 days and not be over rotted, and even with all the directions that can be given in this process of rotting, constant watching is necessary and some experience before it can be done safely and with certainty. The flax crop I consider less

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exhausting to land than any of the cereal grains. It is true the crops do not succeed well sown in succession, but all other crops succeed better after flax than any other, and it is my favorite crop to lay down in grass seeds; and I have uniformly had seed take better after this crop than after any other.

Analysis of the Seed and Straw of Flax.

We give, in connexion with the above article of Mr. Newcomb, an analysis of the seed and straw of flax, showing what substances are extracted from the soil in the cultivation of Flax, and also a prepared manure to restore fertility to the soil in consequence of the exhaustion resulting from this crop. The attention which is being given to the cultivation of flax, will render the accompanying statements valuable and useful to the farmer.

A composition of the Ash of the Seed and Straw of Flax. Johnston's Lectures, 381, 2d edition.

1. *The seed.*

	From Riga.	Dutch.
Potash,	17·59	30·01
Soda,	6·92	1·88
Lime,	8·46	8·12
Magnesia,	14·83	14·52
Oxide of iron,	1·25	0·68
Phosphoric acid	36·42	37·64
Sulphuric "	2·47	2·16
Chlorine,	0·17	0·29
Silica,	10·58	5·60
	98·69	100·90

Flax seeds leave from 4½ to 5½ per cent of ash when fully burned; the entire dried plants leave nearly the same proportion.

2d. *The straw.*

Potash,	11·78
Soda,	11·82
Lime,	14·85
Magnesia,	9·38
Alumina and oxide of iron,	7·32
Phosphoric acid,	13·05
Sulphuric "	3·19
Chlorine,	2·90
Silica,	25·71
	100·00

Per centage of ash, (dry,) 5·00.

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These analyses were made upon the ash of the entire plant. When the flax plant is steeped in the ordinary way of preparing it for the flax mill, much of the saline matter is extracted by the water.

A portion of this steep water has been examined by Sir Robert Kane, and the nature of its saline constituents determined. He found the dry solid extract obtained from it to leave, when burned, 42 per cent of ash, of which the composition was as follows:

Chloride of potassium,.....	9·05
Sulphate of potash,.....	10·48
Carbonate of potash,.....	9·05
" soda,.....	31·43
Phosphate of iron and alumina,.....	7·62
" lime,.....	5·00
Carbonate of lime,.....	9·52
" magnesia,.....	4·76
Silica,.....	13·09
	100·00
Per centage of ash in dry extract,.....	42·01

From this table it appears that the salts of potash and soda, as we should expect, are principally dissolved out during the process of steeping. We have as yet no experiments which show how much of the whole saline matter of the plant is removed by the steep water.

It is not by any means all removed. The scutchings or outside portions taken off at the flax mill, contain much mineral matter, and the flax itself—both the pure fibre and the coarser parts or *pob*, removed from the dressing—leaves, when burned, a considerable portion of ash. The ash of dressed flax and of the *pob* analyzed, gives the following proportions:

	Dressed flax.	Coarser parts or *pob* of flax.
Alkaline salts, chiefly common salt and sulphate of soda,.....	8.93	9.58
Phosphate of lime and magnesia, and a little phosphate of lime,.....	17.89	14.12
Carbonate of lime,.....	45.56	51.43
Carbonate of magnesia,.....	6.38	9.24
Insoluble silicious matter,.....	21.24	15.63
	100.00	100.00
Per centage of ash in dry fibre,.....	1.29	1.78

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Suppose the flax-steep water to be returned to the land, and even the scutchings also, the fibre, as it comes from the mill, and even as it goes to the market, would still carry off a considerable quantity of valuable matter from the soil.

Special manure for the Flax crop.

The importance of providing for the exhaustion made by the flax crop, renders it important to secure the manure that will restore fertility to the soil. The following recipe for supplying what is carried off by the seed and stem of the plant respectively, as prepared by Prof. Johnston, cannot fail of being interesting as well as useful. The substances contained in 100 lbs. of *seed*, supplied by the following mixture:

Bone dust,.....	144	
Sulphuric acid,.....	72	
		216 lbs.
Carbonate of potash, (dry).....		36 "
" soda, "		6 "
" magnesia,.....		22 "
		280 "

Linseed leaves 6½ per cent. of ash, so that for every 100 lbs. of linseed reaped, 13 lbs. of the above mixture require to be added to the land.

The following mixture will supply what is contained in 100 lbs. of the ash of the *stem* of flax:

Bone dust,.....	50	
Sulphuric acid,.....	25	
		75 lbs.
Carbonate of potash, (dry).....		17 "
" soda, "		20 "
" magnesia,.....		21 "
		133 "

The dry stem of the flax plant leaves 5 per cent. of ash; every ton therefore, carries off the land 112 lbs. of inorganic matter, to replace which 150 lbs. of the above mixture must be added. If this be carefully done, and if that which the seed carries off be also replaced, and if the fermented scutchings be returned to the land, the culture of flax will cease to be exhausting.

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NORTH AMERICAN POMOLOGICAL CONVENTION.

We give extracts from the proceedings of the convention which was held at Syracuse the 14th of September, after the close of the Fair, received from the secretary of the convention. It will be perceived by the proceedings that a committee was appointed to confer with the American Congress of Fruit Growers, in relation to an union of the associations, and which we are pleased to announce was consummated; and but one association now exists, which is to hold its meeting for 1850 at Cincinnati.

There wil be found in the extracts which we give, many valuable suggestions on the subject of fruit culture, the selection of fruits for cultivation, which cannot prove otherwise than practically useful to the fruit growers in this State.

The members and delegates of this, the second meeting of the N. A. Pomological Convention, assembled at the common council room at 9 o'clock, A. M.

Delegates were in attendance from the States of Ohio, New-York, Pensylvania, Massachusetts, Illinois, Kentucky, Alabama, Maine, and from Canada east and west.

The collection of fruits was far better than expected, from the fact of there being very few this season, grown in any of the western or eastern states, as compared with usual seasons. Splendid collections of apples were sent from Illinois, and fine collections of pears, peaches, and grapes, were presented by gentlemen from various parts of the States and Canada.

James Dougall, of Canada West, called the convention to order, and nominated Col. Benjamin Hodge, of Buffalo, as temporary chairman.

On motion of Dr. Herman Wendell, Mr. M. B. Bateham, of Ohio, was appointed temporary secretary, who proceeded to read the call of the convention, from the proceedings of last year's convention, as follows:

Mr. J. D. G. Nelson, chairman of the committee of seven, appointed to take into consideration the propriety of holding future Pomological Conventions, reported the following resolutions, which were unanimously adopted.

The committee appointed under the resolution inquiring into the expediency of calling future Pomological Conventions, having had the same under consideration, make the following report:

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Whereas, The N. Y. State Agricultural Society, in drawing together this present convention, have brought together an assemblage of men and fruits which promises great advantage to the public at large, it is thought best to perpetuate the same, therefore,

Resolved, That hereafter an annual assemblage or convention shall be held under the name of "North American Pomological Convention."

Resolved, That this convention shall be held in the coming year of 1849, in the town or city in which the New-York State Agricultural Fair may be held; to convene its session the first day succeeding the closing of the fair; and that the Recording Secretary of the N. Y. State Agricultural Society shall be entrusted with the charge, and respectfully solicited to give due notice of the time of meeting, by means of agricultural journals and cards of invitation to gentlemen pomologists and horticultural societies throughout the Union and the Canadas, that they may send delegates, or attend, and bring or send specimens of fruits for exhibition.

On motion of Mr. Goodsell, of Greece, a committee of five persons was appointed by the chair, to nominate officers for, and also to report rules and regulations for the guidance of the convention. The following gentlemen constituted that committee, viz:

N. Goodsell, of Rochester; F. R. Elliot, of Ohio; Charles Downing, of Newburgh; A. Bryant, of Buffalo; J. P. W. Allen, of Oswego.

The committe reported the following names for officers, who were duly appointed, viz:

President, J. A. Kennicott, Illinois.

Vice Presidents, James Dougall, C. W.; Dr. Herman Wendell, N. Y.; C. M. Hovey, Mass.; M. B. Bateham, Ohio; H. P. Byram, Ky.; Jas. J. Mapes, N. J.

Secretaries, F. R. Elliott, Ohio; B. Hodge, N. Y.

The president, on taking the chair, expressed himself grateful for the honor conferred upon him, and regarded it as a compliment to the west. Seeing the venerable pomologist, *David Thomas*, present, he desired that he be invited to take a seat with the president. The invitation was made and cordially tendered to Mr. Thomas, who took a seat with the presiding officer.

The following order of proceedings was adopted:

1. A committee consisting of Chas. Downing, P. Barry and S. B. Parsons, appointed to bring up varieties of fruits, in order for an expression of members of the convention, as to qualities, &c.

2. That members shall be desired to make brief remarks, and comport themselves to advance the rapid performance of the business of the

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convention, and when otherwise the president shall at once call to order.

3. That when any fruit is brought up and introduced by the committee as first, second or third rate, if any member of convention knows it otherwise, he will so express himself, or it will be passed by convention, understandingly, and without remark, as introduced by the committee.

4. That a committee of three be appointed to examine fruits exhibited, report their names, the names of their exhibitors, and when any varieties are exhibited under local names or synonyms, let it be mentioned, in order that the exhibitor as well as the public be informed of the true names of such variety.

5. That a committee of three be appointed to examine all seedlings exhibited, to judge of their characters, and in such judgment to be guided strictly by the 1st rule of the series of pomological rules, adopted by the N. A. Convention of 1848. When committee judge a fruit to fall below the standard, let them summon before them the exhibitor or originator of the fruit, in order that he may be made satisfied by comparison with others of its unworthiness to name and introduction.

6. That the two last named committees perform their duties before the morning sessions, after adjournment, or during recess.

7. That the reports of State committees be presented to the secretaries, and by them incorporated in the proceedings.

On motion, the chair appointed the following persons to make up the two remaining committees not provided for in the report of the committee:

On examination of names—N. Goodsell, of Rochester; James Dougall, of Canada West; C. M. Hovey, of Boston.

On seedlings—A. Saul, of Newburgh; J. J. Thomas, of Macedon; and A. Bryant, of Buffalo.

Letters and reports from State Fruit Committees were handed in, and in accordance with the 7th rule were deposited with the secretaries.

The following preamble and resolutions were then, after a few explanatory remarks, introduced by Dr. Herman Wendell, of Albany, and unanimously adopted:

Whereas, The National Pomological Convention, held at Buffalo in September, 1848, under the auspices of the New-York State Agricultural Society, composed of delegates from fifteen States and the two Canadas, was the *first* general convention of such character ever convened in the United States; and whereas that convention unanimously resolved, that hereafter an annual convocation of a like character should be held under the title of the North American Pomological Convention, and that the first meeting with that title should be held in the autumn

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of 1849, at the place where the great fair of the New-York State Agricultural Soceity was to be held, and on the day succeeding the close of said fair; therefore we consider this convention entitled by courtesy to perpetuate itself; but being aware that a convention of an analogous character was held in the city of New-York in the autumn of 1848, and also that said convention organized itself into a permanent association, under the title of the American Congress of Fruit Growers, which is to assemble in said city of New-York on the 2d day of October next, and believing that the advancement of Pomological science as well as the inclination and interests of Pomologists throughout this continent will be promoted by a merging hereafter of the two apparent conflicting associations into one general organization for future operations; therefore, be it

Resolved, by this convention, that a committee of five be designated by its president, whose duty it shall be to attend the coming session of the American Congress of Fruit Growers, and confer with said congress, or a committee whom they may select, in relation to the merging of the two associations, and so far as this convention is interested, the settling of questions of priority of organization, place of next meeting, and title of association, shall be left to the committees whom the two organizations may appoint, and that we will exert ourselves to induce a general attendance of those interested wherever the joint committee determine the next convention shall be held; but we cannot omit giving it as our opinion, that the cause of Pomological science, will be most promoted and the feelings of the great mass of fruit growers best satisfied, if the next meeting should be held at Cincinnati or some other western city.

The president remarked that he was sent here by the fruit growers of Illinois. It was a general feeling among them that they could not attend but one convention—they could not do without the eastern people—they therefore wished to merge the two conventions, and throw themselves upon the generosity of the people of the east.

In conformity with the resolution just introduced and adopted so unanimously by the convention, he would appoint the following named gentlemen as delegates to meet in conference with the New-York Congress of Fruit growers:

Herman Wendell, Benjamin Hodge, Franklin R. Elliott, Charles Downing, Jas. J. Mapes.

On motion of Dr. Herman Wendell, the president, J. A. Kennicott, of Illinois, was added to the committee.

The committee appointed to introduce fruits for discussion by members of the convention, then proceeded with their duties.

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The following Plums were decided to be of first character: Smith's Orleans, and Lawrence's Favorite; of nearly first character, Lucombe's Nonsuch; of second and third character, for dessert, but both good for the kitchen, Duane's Purple and Long Scarlet. The following decisions were arrived at in relation to Pears, viz.: The Fondante d'Automne was decided to be first rate; Beurre Diel, nearly always first rate, best on quince stocks; Passe Colmar, by some as of second quality, by others as the king of pears—by all, as requiring rich and careful cultivation to attain perfection. Fulton, as nearly of first quality by most, by others as second—by nearly all as hardy, productive and adapted to most localities. Gansell's Bergamot, as first rate, somewhat variable; a moderate or poor bearer; growth of the tree short and stumpy. Duchesse D'Angoulême, as of second quality; there was quite a diversity of opinion in regard to this variety; taking its large size, free growth and great productiveness into consideration, it was regarded by many as being well worthy of cultivation; by some it was valued as highly as the Bartlett; by all considered worthless unless upon quince stocks. Napoleon, as good second rate—a fine grower and good bearer. St. Ghislain, fully of first character, in nearly every locality. Julienne, sometimes nearly of first character; very often of second, and frequently worthless and unworthy of cultivation—never good, unless ripened in the house. Buffum, considered as of first character by some members, but by most as of second. Long Green considered by a few as nearly first rate, but by nearly all as a thrifty grower, but of second quality. Frederick of Wurtemburgh, by most present, as very variable. Mr. Hovey had seen it very beautiful; considered it a variety which he would never wish to throw out of his collection, but it must be highly cultivated, and the fruit thinned out on the trees. Mr. Elliott had produced very fine ones by feeding the trees with bone dust. Mr. Barry would retain it in large collections but not in small ones. Beurré d'Amanlis, voted second rate. Mr. Barry considered it generally first rate. Mr. Hovey thought it would be fine on a tree with a few, but otherwise when an excessive crop is grown. Beurre Bosc, considered first rate by all. Mr. Hovey remarked that it would not do well on the quince unless double worked. Bleeckers' Meadow, reported as second rate. Mr. Thomas thought it fifth rate; most considered it varying from second to fifth rate, and some as unworthy of cultivation. Dix, was well known to but few present; those who did know it, however, considered it of first character. Mr. Barry said that it would not grow on the quince. Easter Beurré, reported as second rate. Mr. Hovey, however, considered it as first rate, when well ripened after

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being properly grown. Mr. Barry said that when grown on pear stocks it fell so far short of attaining maturity, that it could not be ranked as first rate; on the quince, however, he considered it one of the best of pears. He also remarked, that in France, where it was always grown on the quince, it was one of the finest pears grown, and it was found for sale in the cafés during the whole winter, large and fine. Dr. Wendell considered it unworthy of cultivation when grown on pear roots. Col. Hodge had cultivated it for eight years past, and had found it gritty and very difficult to ripen, he had therefore ceased cultivating it, notwithstanding it was a good bearer.

Apples.—The following decisions were arrived at in relation to Apples:

The Roxbury Russet was considered first rate by all present. The Hawthornden, as second rate for dessert, but valuable as a kitchen fruit; and also very productive. Maiden's Blush, reported as second rate; considered by some as valuable from its productive habit, having borne this year when scarcely any other had done so. Autumn Swaar was introduced for information; Mr. Goodsell had known it many years, but considered it second rate. The Rambo Apple—Dr. Kennicott said it was considered *the* apple for fall and early winter use in Illinois; Mr. Bateham said that it was valued more highly than any other apple in Ohio. Rawles Janette—the president of the convention said that this apple was highly valued in middle Illinois; it succeeds well there, and from its habit of late blooming it escaped the spring frosts. Mr. Byram, of Kentucky, stated that it was the standard fruit in his state, and in consequence of its escaping the injuries from frost on account of its late blooming, it was often the only apple they had. It was very productive, bearing every year, and often was kept until August. Mr. Bateham considered it a valuable variety, for various reasons, particularly on account of its being a good keeper.

The committee on seedlings presented their report.

APPLES.

1st. *Fink's Seedling.*—Of the report of the Ohio fruit convention; specimens presented of 1848 and '49; second rate in flavor, and from examination of specimens, valuable only for remaining juicy and keeping remarkably.

2d. *Heickes Sweet.*—Of Ohio fruit convention; about third rate and and not worthy of cultivation.

3d. *Summer Russet.*—From Parsons & Co., Flushing; size, below medium; form, roundish conical; color, yellow, partly russeted. A

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pleasant, rather sweet, and of a moderately rich, spicy flavor; worthy the attention of pomologists.

PEACHES.

Seedling Cling.—From W. G. Verplanck, Geneva. Large, beautiful yellow peach, of medium quality. The committee do not consider it worthy of general introduction.

Seedling—From Mr. Taylor, Amherstburgh, C. W. Color, red, white flushed; free stone, medium size, melting, of good quality; but having been kept several days, could not decide on its value.

PLUMS.

Dorr's Seedling.—From Albany; a very productive, new sort; the specimens imperfect; but the committee were favorably impressed with its value.

Col. Young's Seedling Egg.—An improvement in flavor on the White Magnum Bonum, smaller in size. The committee can only commend it to further examination.

Denniston's Yellow Seedling.—Mottled seedling, and pear shaped, red; were in such an imperfect state that the committee could not decide on the quality.

Madison.—Rather below medium; yellowish green; broadly blotched with reddish brown; rich, sweet and excellent; well worthy of public notice. (This variety was not entirely ripe.)

PEARS.

From Flushing, L. I.; closely resembling Buffum in appearance and flavor, if not identical.

In conclusion the committee must remark, in justice to themselves and to the fruits presented to them, that it is impossible to decide satisfactorily on the character of a new variety, from a single examination; especially if immature or partly decayed, or injured by long carriage, and therefore the committee would not wish these reports to be regarded as more than partly conjectural.

Many of the members in incidental convention having signified their intention not to remain in attendance upon the convention another day, owing, in many cases, to fatigue in attendance on the State Agricultural Fair;

Mr. Hovey moved that the reports of the proceedings of this convention, together with State fruit reports, letters, &c., be prepared and published by the secretary, under the superintendence of the other officers. Passed.

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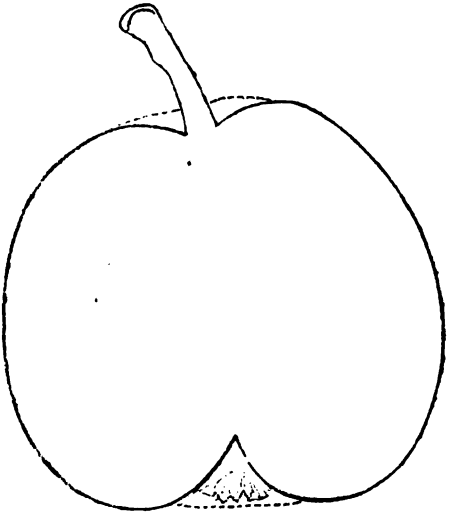
After the usual resolution of thanks to the presiding officers, &c., the convention adjourned to meet in accordance with the rule adopted in the resolution of Dr. Herman Wendall, viz: to meet at such time and place as should be designated by the committee.

The following description of a very valuable, new seedling pear, was received from Professor J. P. Kirtland of Cleveland, Ohio.



THE KIRTLAND PEAR.

SYNONYMS.

Seedling Seckel,

Kirtland Seedling.

Size, medium; the circumference six and a half inches; length, including stem, two and a half; form, globular ovate; exterior color, rich crimson russet, varying to a dull green; texture, fine, melting, juicy and rich; color of flesh, white; flavor, aromatic, sweet, and in the highest degree delicious; seeds, unusually full, short and blackish; stem, six-eighths of an inch in length, thick and somewhat curved; eye, small, moderately deep, with the segments of the calyx short, reflexed and persistent; season, September; color of wood and growth, the wood is of the same color as the fruit, and the general habit of the tree resembles a thrifty white Doyenné.

Remarks.—In the close of the year 1819, I furnished my brother, H. T. Kirtland, with a few seeds of the Seckel pear, grown in the State

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KIRTLAND.

R. H. Pease Lith. Albany.

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of Connecticut. From these he raised several trees on his farm, in Poland, Mahoning co., Ohio, one of which he gave me in the year 1825, and which produced the fruit exhibited at the New-York State Fair, last autumn, at Buffalo, and noticed in vol. viii, pages 108 and 109, of Transactions of N. Y. State Agricultural Society. It is no novelty in Mahoning co., Ohio, but is well known by every cultivator of fruit, and is esteemed as one of the finest varieties. In hardiness and productiveness it far excels the parent Seckel, and in point of flavor is esteemed as superior by many people. The name attached to it has designated it for years, and was applied by the public as a compliment to the originator of the seedling, Henry T. Kirtland.

Valuable reports were made by J. A. Kennicott, of Illinois; Dr. Herman Wendell, of Albany; W. R. Coppock, of Buffalo; J. W. Bailey, of Plattsburgh; F. R. Elliott, of Cleveland, Ohio; F. K. Phœnix, of Wisconsin; J. C. Holmes, of Michigan; C. Goodrich, of Vermont; which are published in the proceedings of the convention, and which we regret being unable to publish at length. These reports contain many valuable and important suggestions as well as facts in relation to the cultivation of fruit in the different sections of our country, that must prove of great practical value to pomologists. It is a matter of congratulation, that so much interest has been excited on the subject of fruit culture, and the enlisting of so many intelligent minds throughout our country on this subject will lead eventually to the cultivation of valuable and choice fruits of the different varieties, and the exclusion of the worthless from our nurseries, as well as from our orchards and gardens.

FRUIT CULTURE IN OHIO.

F. R. Elliott, Cleveland.

In preparing some few remarks upon the culture of fruit in Ohio, it cannot be presumed that I will furnish statistics of the number of trees and varieties of fruits in cultivation, or the amount of bushels produced, but that I will glance at some of the leading features of a production which at no distant day promises to make no small item in summing up the resources of a State already reputed for her agricultural wealth.

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In Hamilton county, the south-western portion of the State, and in which is located the city of Cincinnati, we find a greater amount of acres, comparatively, devoted to the culture of fruit than in that of any other county, and simply because of the immediate and permanent market. The wealth, produced from other sources than those of horticultural pursuits, and, placed in hands of persons whose natural tastes inclined thereto, has been the means of many valuable experiments being tried, especially in the culture of the grape, and of the introduction for the purpose of testing many reputed new and valuable fruits. In the culture of the strawberry, so far as regards extent of acres, and quantity of bushels produced, there is probably no section in the world that can vie with the suburbs of Cincinnati. The variety for market is however confined to one or two sorts. Cultivators preferring to plant their grounds with such as are known to be productive, rather than venture upon the "puffs" of self-interested originators of new kinds, and therefore while among the amateur gentlemen's gardens almost every *new* variety may be found, the stranger visiting the "city markets" would judge that county behind the age in the culture of fruit. While however Cincinnati market stands pre-eminent for the quantity of strawberries sold there, it must not be imagined that other sections are deficient in their attention to the culture of this fruit, for such is the spirit of our people that hardly a poor family throughout the smaller country towns but what is now supplied with a "small patch" of strawberries, in place of going, as was the case but a few years since into the fields to glean a pint in a day. The suburbs of all the larger towns and cities also, as Dayton, Zanesville, Columbus, Chillicothe, Springfield, Sandusky, Toledo, Cleveland, Ashtabula, Ravenna, &c. &c., all over the State have ample fields of this fruit to render it always procurable in the markets at a fair price. In the northern parts of the State these fields will be greatly added to within a few years, inasmuch as the traverse of the State by railroads will render transportation easy, and therefore cause the season to last longer by about two weeks.

In originating of new varieties, Ohio has perhaps performed thus far her share; but whether those introduced now as of exceeding value, shall be proved and noted in like manner ten years hence, remains to be seen. Mr. Burr has done most in production of new varieties, and has certainly grown some very handsome berries, but they remain, as I think, yet untested for the million. For so writing I presume I shall be stigmatized as heretofore I have been, as being "incredulous beyond reason," but I have learned that it is sufficient time to award full praise, when there is no question to be raised of its sincerity.

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The Grape.—This fruit, although more extensively cultivated about the hills bordering on the Ohio river and along the south-eastern borders, is nevertheless to be met in considerable abundance in all parts of the State. The Isabella and Catawba varieties are hardy everywhere, and may be ripened perfectly. Of the Isabella there are several large vineyards out of what is sometimes termed the "vine region," and it is found equally productive and profitable by the man living fifty miles from any principal market, as by him who grows his grapes and makes his wine where land is valued at one hundred instead of five dollars an acre. The country growers, I have found, however, are not generally well skilled in preparing their wine, and while it commands a good price in their neighborhoods, would not perhaps side by side with an article made by those who have better facilities command equal price. The difference I think, however, would not equal that of the extra cost of land, labor, &c., &c. The north-western portion of Ohio being much of it a limestone soil, or having such a foundation, has, wherever tried, been found to produce grapes of the best quality, and thus far without any predisposition to mildew or other disease. Were a man desirous of engaging in the culture of the grape for wine, methinks he would find his account rather in some sections of the north-western borders than in those of the south-western.

In production of new varieties Ohio cannot, I think, claim any of especial note, saving that brought to notice by Mr. Longworth, as the "Ohio" or "Segar Box," a variety desirable for the amateur's garden, but not for the man of every-day life. Numerous seedlings are yearly brought out, but I have met none as yet that would bear comparison with Catawba.

The Pear.—The culture of this fruit is comparatively unknown in many sections of our State. As but a few years have elapsed since the really good pears have become known and trees offered for sale by our best nurserymen, it is not surprising to hear the reply made by men who never having eaten aught but those of austere character, "that pears are good for nothing to eat." In the cities and large towns the wealth and taste of amateurs, acquired by travel, has introduced many varieties. From some cause, not yet settled by horticultural writers, the trees have not succeeded well in most sections of Ohio. Southern cultivators attribute it to sun blight or frozen sap blight, causes similar and producing like results; the first produced in mid-summer, and when the tree is apparently in full vigor; the second produced by a clear hot sun succeeding an extreme cold night in winter. From this fact of the pear trees dying out ere they become productive, arises another cause toward

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explaining the limited extent they are planted. Gentlemen of ample means, and with more than ordinary skill in culture, have attemped their growth in sections of the south and southwest of the State, but with so little success that they are mostly unwilling to advise the man of small means to plant them. The practice of dwarfing them upon the quince has been found of no material benefit as a measure of health and longevity. With these discouragements however, there are yet found in gardens of amateurs at the south, many of the most choice varieties in annual bearing. The Seckel is abundant in most of the markets of the southern and central towns, and is almost the only pear brought to the markets to any extent.

In northern Ohio the pear succeeds admirably, and so also in northwestern and the south-eastern portions. Trees introduced from the east to Trumbull county over 25 years since, are in full vigor and productiveness, and while we notice this, let us remark that their trees were brought from a nursery in New-Jersey, and where they were *grown slowly* while young, but that trees from nurseries of later days have not succeeded as well. That in all parts of the State seedling pear trees of large size are found, showing that it is not the climate or soil, but some farther cause that leads to the result so fatal.

Around Cleveland the pear succeeds admirably, and such has been the attention paid to the subject of fruit growing in this section within a few past years, that we have over 400 varieties of the pear named and under cultivation at this time.

In production of new varieties of the pear it may be seen by referring to authors that Ohio claims some reputed valuable kinds. That they are more so than many others cannot be presumed, nor can it be imagined that they will endure the culture of the south any better than those already tried. Without making it a matter of many words, I will give my views of the cause of the non-success in growing the pear in southern latitudes where the soil is extremely rich. It is upon the same principle that may be represented in an animal, and that is, over feeding while young, tending to excite and enervate the constitution, and if continued, to cause early maturity or more probably some disease resulting in death. The same is the case with the pear trees, they are first procured from a nursery where it has been for the advantage of the proprietor to cause rapid growth, by liberal dressings of his land, and thus early fit his trees for market, they are provided therefore at first start with sickly constitutions, are removed, and if not left to die of starvation and change in hands of raw cultivators, are again excited and forced on until every portion of the tree is enervated and predisposed to dis-

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ease which shows itself at the first exposure. That this is the reason, I cite all the slow healthy growing Seckel trees, all the natural seedlings, that were first started in fence corners and left while young to grow inch by inch in the grass from year to year, to appear and bear testimony. One other cause perhaps equally fatal to pear trees is want of drainage. Some cultivators so plant that their trees grow finely two or three years, when the roots reaching a stratum where water stands most of the time, canker or gangrene is at first produced, and in two seasons more at farthest death ensues.

The culture of the cherry has been attended in many sections of Ohio with results similar to that of the pear, notwithstanding which there are many fine orchards of this fruit scattered about the State; the most, probably on the lake shore borders. As a market fruit it is undoubtedly profitable. As a healthy, long-lived tree, there are evidences sufficient to prove that nothing is wanting in the soil, nor that it is necessary to remove "outer cuticles" or "gash" them, in northern Ohio. An orchard of this fruit in the vicinity of Cleveland, has produced some nine hundred dollars income in a single year to the owner. Twenty miles from Cleveland there are numerous large healthy mazzards, that annually produce abundantly, and snch is the demand for dried cherries that the owners make a double profit by drying the flesh and disposing of the pits to nurserymen; thus making some single trees return them from fifteen to thirty dollars annually. A pretty good return for mazzard cherries.

The peach, while it has been pretty extensively planted for market produce, has nevertheless had so little thought bestowed upon the varieties that now when many of the orchards should be producing abundantly, they are found to fail almost entirely. A large proportion of our new native varieties, under name, have been produced under a warm sun, but in a poor, sterile soil, and even in such soil the growth is very rapid. The same varieties propagated and grown upon the rich soils of many sections of southern Ohio, combined with her clear burning suns, are increased beyond measure in vigor, and rendered in a measure diseased or enervated, and blossom buds are so swollen and over gorged with nutriment, as to produce debility, rather than health, rendering them subject to be fatally acted upon by the slightest changes of weather. The result is that cultivators are falling into the belief that natural seedlings are more hardy and productive than budded varieties, when, as I think, they should select such valuable budded kinds as are of naturally slow growth, making wood of close firm texture, rather than those which make long jointed, coarse, spongy wood.

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As a matter of profit, good varieties of budded peaches are worth in almost all markets in Ohio, from twelve shillings to two dollars per bushel as an average price. In many sections considerable attention is paid to drying the fruit, of which large quantities are shipped to eastern and western States annually.

Plums, from the abundant population of Germans in Ohio, are found in all sections, and the tree apparently thrives well. Some seasons however, it has shown evidence of leaf blight, but that may be presumed will pass away. Not so, however, an insect called curculio, which punctures the fruit for depositing its progeny, and from which results are fatal in almost all sections to profitable crops of fruit. When the fruit can be obtained, it will command at most of the lake shore ports from five to eight dollars a bushel. A few years since dried plums were a source of income to many Dutch farmers, but late years the curculio has absorbed that income, in pursuit of his own ways without regard to numerous preventives used as remedies.

The apple is the main fruit planted by the country farmer, as well as by the man who is looking forward to profits from an orchard, and in all sections of Ohio apple orchards may be found, and found also, when any care has been bestowed upon the trees, in a healthy state. In early days, when the country was first settled, the apple orchards were all planted with seedling trees. Many of them with trees grown from the seeds of Roxbury Russet, Rhode Island Greening, on other well-known varieties of apples in New England states.

These seedlings have produced many fine and valuable fruits, in some cases closely resembling the parent fruit, in other instances there has been return to an almost wildling. As a whole the orchards of seedlings have, however, been productive only of poor fruits, and this so generally acknowledged that, as wealth came to the proprietor in return for his toil, he has either planted new orchards or had his old one engrafted. As a market fruit and source of profit, nothing requiring so little care, will produce so great return, and so well is this known that many sections are becoming more a fruit or apple growing country than of repute in growth of any other product.

Upon the Ohio river, large orchards are annually planted with a view to the supply of the southern trade, and as yet the demand has more than kept pace with the supply. One point, however, among the growers there, I think has been overlooked, and that is the quality of long keeping fruit. So difficult has it been to procure a well known fruit, and a long keeper at the north, to resist decay ere the spring months,

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that in some cases anything that possessed qualities of keeping sound until June would be propagated without regard to its eating qualities as regards flavor.

The fact that most of our northern originating apples reputed for keeping, prove only fall or at most early winter fruits, when grown in southern Ohio, has had a tendency to cause the grower of that section to secure those known as long keepers in his own section even if they were not of good quality. The same fact has also had a tendency to create doubt of the judgment of an eastern man, when advising for culture such fruits as are universally thrown aside by most cultivators in that section, and thrown aside not from doubt of their success, but from knowledge of experience that what may be a long keeper in Rochester or Boston, will be a December or January fruit at Marietta or Portsmouth. The market demand for good apples in all parts of the State is now such that cultivators do not hesitate to plant out trees, knowing that if they grow a surplus it will readily meet sale. Profit is also an inducement to the same, it being now well known that an acre of orchard will produce more net income than two acres of wheat or corn; this is especially so in northern and southern Ohio, where there are ready facilities to market. In one instance a man but a few miles from Cleveland, has sold $500 worth of apples from an orchard of two acres, in one year. In another, a common farmer, having somewhere about one hundred acres of land, receives more return from his orchard of about two hundred apple trees than for all other parts of his farm. The settlement of Germans at Zoar, have disposed, to the best of my recollection, (I once had a statement, but have lost it,) in one season of apples to the amount of $1,200 dollars, and nine hundred barrels of cider, beside drying some fifteen hundred bushels. Similar amounts are doubtless the receipts of farmers and fruit cultivators in almost all towns throughout the State, evidencing that Ohio can certainly claim to be a fruit growing State.

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MANUFACTURE OF SALT AT STATE WORKS—MARL DEPOSITS, &c.

BY E. MERIAM.

December 29th, 1849.

I but recently returned from a visit to the public salines of Onondaga, having for many years past frequently visited them, making extensive and minute surveys of that district, and connecting these examinations with researches in other sections of the State of New-York, and of the district of territory west of Lake Ontario in the province of Upper Canada.

More than five millions of bushels of salt have been made the present year, and has been sold as low as seven cents and six mills per bushel. About forty gallons of brine make a bushel of salt, and one cord of wood is required for the evaporation of brine for forty bushels. The quantity of wood used daily at these salines during the season for making salt is equal to eight hundred cords. This great consumption of fuel has therefore had the effect of clearing an extensive district of woodland, and bringing it into cultivation.

Mr. Gere, State Superintendent, stated to me when recently at these salines that the average price of salt per barrel, for the season, was about 75 cts., the highest price, 87½, the lowest 65 cts.

To evaporate the brine for five millions of bushels of salt, (the quantity made the last year,) would require 125,000 cords of woods, which at $2.50 per cord, would cost,...	$312,500
One million of barrels are required for packing, which at 25 cts. each is.....	250,000
The laborers' wages for boiling 5,000,000 bushels, at $1,75 per hundred, is.....	87,500
The State duty of 1 ct. per bushel, is.....	50,000
	$700,000
1,000,000 barrels of salt, at 75 cts. per barrel, (this being the average price of the season,) is.....	750,000

Thus it appears from a receipt of three-fourths of a million of dollars from sales for the year, that the farmers, for the wood; the coopers,

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for the barrels; the laborers for the boiling, and the State for the duty, are paid $700,000; leaving but $50,000 per annum as the product of the salines to the manufacturer, out of which is to be paid the expense of kettles, buildings, &c., &c.

This view of the business presents facts that are instructive; for it is the farming interest of a large district around, that derive the greatest benefit by the sale of the wood, the timber for the barrels, and the products of the farm to feed the workmen.

It will be seen by the following estimate, taken from Mr. Gere's letter, that the manufacture of solar salt is the most productive. There are 60 vats to the acre and 50 bushels to the vat, producing 3,000 bushels, (or 600 bbls.,) which, at the average price of 9s. 9d. per barrel, is $731.25.

Interest on cost of vats, at $1,500 per acre, at 7 per cent, is	$105 00
Estimated expense of labor, &c., &c., at 4 cts. per bushel, on 3,000 bushels, is	120 00
State duty of 1 cent per bushel,	30 00
600 barrels for packing at 25 cts. per barrel,	150 00
	$405 00
Leaving for profit per acre,	$326 25

Or $108.75 on every 1,000 bushels of salt.

In the evaporation of brine by the heat of fire, much salt is vitrified, by adhering to the bottom and sides of the iron kettles in which the fine salt is made. This vitrified salt is as valuable to farmers for salting cattle in pastures, as the best solar salt; in fact, it has an advantage over it, for when thrown into pastures it is more durable, not dissolving by rains. This salt caking is also valuable used as manure.

When I visited the salines in the autumn of 1848, I obtained a lump of the salt cake, which had been thrown away by the workmen, brought it with me to the city of New-York, and gave it to Messrs. Boorman, Johnston & Co., who were at that time interested in the soda ash works on the Passaic river, near Newark, New Jersey. They caused an analysis to be made at the works, and this specimen was found to contain *ninety-eight* per cent. of pure chloride of sodium; a greater proportion of pure salt than is to be found in any salt in our market. The ordinary salt cake doubtless would be less rich than this sample.

Some few years since, a shaft was sunk in the saline district at Lockpit, 40 miles west of Syracuse, to the depth of 400 feet, and brine testing 100° by the salometer, was obtained. About twenty gallons of

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this brine produced one bushel (or fifty-six lbs.) of salt. It is of easy evaporation and of rapid crystalization, but, owing to the presence of the muriates of lime and magnesia, it is deliquescent, and in warm, damp weather dissolves. I have no doubt but that it will be found valuable for agricultural purposes, and can be afforded for 4 cts. per bushel. When the second vein of water was reached in sinking this well or shaft, the commingling of the water from the two veins caused a rapid crystallization of sulphate of lime, in eight sided flattened prisms, perfectly transparent; and so abundant was this formation that the pumps were choked by the rapid accumulation. I calcined some of these crystals, and found their structure was of the most minute *laminæ*, and that by calcination they became opaque. This well at times overflowed and had periods of blowing or roaring, owing to the presence of hydrogen gas.

At the deep boring at Montezuma, (604 feet,) brine was obtained of the same specific gravity as that of the Lockpit well, and containing the same properties. When the greatest depth was reached, the brine rose to and overflowed the surface for a great distance and rapidly crystalized by the heat of the atmosphere.

Drainage of the lowlands west of Utica, Marl, &c.

I have examined an extensive level district of country lying west of Utica, where thousands of acres, containing the best soil, is flooded or saturated with water, which could be easily drained into Lake Ontario by deepening the outlet of Oneida Lake and portions of the beds of the Seneca and Oswego rivers. The expense would be but trifling, compared with the benefits to be secured, and the product of the land thus reclaimed, would in a single year repay the whole expense; in addition to bringing a large district into cultivation, that region of country would be rendered more healthy and the roads made drier and better.

White marl and black alluvial earth are abundant in this level district and near the Erie canal. These earths are sufficient in quantity and quality, to enrich every acre of poor land in the State, and can be transported to the shores of Long Island for two dollars per ton. A ton of this earth or of the marl, is probably as valuable for manure as a ton of leached ashes, and equal to about three New-York carmen's loads. Leached ashes cost the Long Island farmers about one dollar and fifty cents per carman's load, delivered on the shores of that island. The importance of improvement to secure these substances so abundant and so convenient for transportation to market, must be obvious, and should lead to vigorous efforts to secure the accomplishment of the work.

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AGRICULTURAL STATISTICS.

Returns from several towns are given, which furnish a statement of the various agricultural productions, the expense of cultivation, the value of the products, and the profits to the farmer. There are also, general statements of the agricultural condition of the counties of Schoharie, Oswego and Yates. These are valuable statements, and an examination of them, in connection with those given in our last volume of Transactions, from Seneca county, must satisfy every one, of the great importance to the agricultural interest, as well as to the interests of the State at large, of having annually a return made of the agricultural and manufacturing products of the State.

This might very easily and satisfactorily be performed, by making it the duty of the assessors at the time of preparing the annual list of taxable property, to ascertain the amount of agricultural and manufactured productions of the town or district, and articles of household manufacture, with the number of animals, &c., to be returned to the clerk of the board of supervisors, and by him transmitted to the State department, or to the Society. The Legislature would thus be furnished annually with reliable data, and prepared for any required action to advance the great producing interests of the State.

Its influence upon the agricultural interest would be most salutary, in stimulating those who are deficient in their methods of cultivation, to efficient efforts to improve, and thus enable them to compete with those more successful. It cannot, we think, be doubted, that this matter is of sufficient importance to secure the attentive consideration of the Legislature.

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LIVINGSTON.

Report of the Agricultural condition of the town of Caledonia, Livingston county.—From Hon. A. H. McLean.

ESTIMATED PRODUCTS.

	Acres cultivated.	Quantity of seed per acre.	Quantity raised per acre.	Cost of cultivation per acre.	Time of sowing or planting.	Kinds produced.	Profit per acre.
Wheat,	7,040	1¼ bushels.	20 bushels.	$9.00	Sept. 15.	Flint & Soules.	$12 25
Barley,	180	2¼ "	25 "	3.50	April 15.	2 rowed,	9 00
Oats,	835	2 "	36 "	3.50	May 1.	White & Black.	11 25
Rye,	15	1 "	15 "	7.50	Sept. 20.	.....	.....
Buckwheat,	20	¾ "	20 "	3.00	July 5.	.....	7 00
Indian Corn,	576	⅝ "	35 "	8.50	May 15.	Yellow.	9 00
Flax,	.....	.....	.....	.....	.....	.....	.....
Hay,	7,700	.....	1½ tons.	1½ to half.	.....	Clover & Tim.	4 75
Potatoes,	141	8 "	90 bushels.	6.50	May 10.	Merc. & others.	.....
Root Crops,	12	.....	50 "	3.00	July.	Turnips, Car's.	.....
Pod Fruits,	.....	.....	.....	.....	.....	.....	.....
Grass Seeds,	50	6 to 8 lbs.	2 "	.....	.....	Clover.	7 00

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	No. of lbs.	No. of Cows in milk.
Butter,.....	75,373	947
Cheese,.....	13,082	....

Live Stock.

	Number.
Bulls,.....	30
Cows,.....	1,045
Steers,.....	357
Oxen,.....	113
Heifers,.....	185
Calves,.....	243
Bucks,.....	355
Ewes,.....	10,582
Lambs,.....	4,755
Horses,.....	1,018
Swine,.....	2,180

Wages.

Men, per year, $120 to $140; per month, $10 to $15; per day, 50 cents to $1.50.

Females, $0.75 to $1.50 per week.

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ONONDAGA.

Report of the Agricultural condition of the town of Camillus.

ESTIMATED PRODUCTS.

	Acres cultivated.	Quantity of seed per acre.	Quantity raised per acre.	Cost of cultivation per acre.	Time of sowing or planting.	Kinds produced.	Profit per acre.
Wheat,.....	3,000	1¾ bushels.	16 bushels.	$7 00	Sept. 10.	Club & Mediterran'n	$9 00
Barley, ...	1,200	2½ "	20 "	5 00	April 10,	2 rowed.	4 00
Oats,.....	1,100	2½ "	30 "	4 00	April 15.	.....	4 38
Rye,*.....	.....	.....	.....	.....	.....	.....	.....
Buckwheat,.....	.....	.....	.....	.....	.....	.....	.....
Indian Corn,....	1,700	6 quarts.	25 "	7 00	May 10.	Flint & Dutton.	8 75
Flax,.....	.....	.....	.....	.....	.....	.....	.....
Hay,.....	2,000	.....	1½ tons.	2 00	.....	.....	5 50
Potatoes, ...	300	10 bushels.	80 bushels.	10 00	May 1.	.....	.....
Root Crops,.....	.....	.....	.....	.....	.....	.....	.....
Pod Fruits,.....	225	3 bushels.	25 "	5 00	April 10.	.....	.....

* Very little raised—say twenty or thirty acres at fifteen bushels per acre.

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	No. of lbs.	No. Cows in milk.	No. of Fowls.
Butter,.....	85,000	1,050	.....
Cheese,.....	105,000	.....	.....
Poultry,.....	.....	.....	5,000

Live Stock.

	Number.
Bulls,.....	50
Cows,.....	1,100
Steers,.....	500
Oxen,.....	220
Heifers,.....	400
Calves,.....	450
Bucks,.....	200
Ewes,.....	3,200
Lambs,.....	2,400
Horses,.....	760
Swine,.....	1,400

Manures.—Common barn-yard, plaster, and lime.

Wages—$120 per year; from $10 to 14 per month.

The annexed returns are as full as I can render at present. The number of farmers who keep farm-books or have accurate surveys of their fields, are so few, as to make it very difficult to determine with as much accuracy as you require.

Spring crops, particularly late sowed oats, corn and potatoes, have been very much injured by the drought, so as to make them fall much below the average crops for the last few years.

Stock.—Our stock consists of a cross of almost every known breed, but the Short Horn cattle are fast being introduced, also merino sheep, some very fine specimens are to be found in the town.

D. L. PICKARD.

Spafford, Nov. 10th, 1849.

B. P. JOHNSON, ESQ.,

Cor. Sec'y N. Y. S. Agricultural Society:

DEAR SIR—Your Circular, addressed to me, was received at so late a day that I am unable to give, definitely, the information which you desire. Yet as some general statements may not be wholly useless, and as they will at least show that an interest is felt in the efforts of your society, I think proper to reply.

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The principal agricultural productions of this town are winter and spring wheat, barley, oats, indian corn, flax to some extent, sheep, cattle and swine. The soil is peculiarly adapted to a "mixed husbandry," and consequently these productions are of about equal importance. The average yield of *wheat* per acre is about twenty bushels, though thirty and thirty-five is not an uncommon yield. The most common varieties of winter wheat are Mediterranean, Irish, Hutchinson and Flint; of spring wheat, Italian, Dutch and Black Sea; these may be local names but I know no others. Wm. Fuller, Esq., of Skaneateles, has introduced from Wisconsin another variety of spring wheat which promises well. It is known by no name here—has a short thick head, the kernels thickly set in, bearded, chaff and straw reddish color, the berry short and plump.

Barley produces upon an average about thirty bushels per acre, and is cultivated quite extensively in this town, every part of which is well adapted to its growth. In parts of the town, barley and spring wheat are considered better crops than oats, principally, as it is customary either to seed to grass with the crop, or sow the stubble with winter wheat, neither of which is safe with oats. The soil is adapted to them, and good crops are raised.

The average yield of *Indian Corn* is perhaps not more than thirty bushels per acre, though from forty to sixty bushels are quite common.

Hay—The hay raised is wholly consumed; yield one and a half to two tons per acre.

From the middle of June, the season has been excessively warm and dry; crops have not been materially injured by it, except corn, potatoes, and other late crops, which have suffered much; with these exceptions, the crops compare favorably with those of last year.

Two years since, wheat and barley were much injured by the Hessian fly, but since then they have not been affected. Wheat this season has been slightly injured by the "weevil," as it is commonly termed in this region, but probably the "wheat midge." This season is the first of its appearance.

Potatoes have been considerably diseased for several years, but as yet there is no complaint this season. Early planting has been adopted as a preventive, though it is not decided to be a sure one. No other preventive has been discovered. But little attention has been given to the culture of roots, though they succeed well whenever tried.

There are no large dairies in town; considerable butter is however made, though but little cheese. Dairying is, I think, not on the increase.

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Of the fruit culture the less said the better. An interest however seems to be awakening.

The only breed of cattle in town is native, in some cases improved by mixture with the Devon. Some quite valuable cattle are raised. Oxen in ordinary condition sometimes selling as high as $100 to $140, and cows for $30 to $50.

Good ordinary work-horses are raised.

Much attention has for a few years been given to wool-growing. The principal breeds of sheep are a mixture of Saxon and Merino, and native or "old fashioned," improved by Saxon and Merino. The common yield of wool is 3½ to 4 lbs. per head, selling this season for 30 to 35 cts. There are a few coarse wooled sheep in town, but I am not very familiar with them. The swine is probably a mixture of all breeds, producing however a good one; at 18 months old they weigh when fattened from 300 to 500 lbs.

Manure—The kind mostly used is the barn-yard; lime and plaster are used, the latter to a considerable extent, the former to but a small extent.

Schools—Nothing has as yet been done towards introducing the study of agriculture into the common schools, but by a little effort I think it might be introduced.

Respectfully,

SIDNEY SMITH.

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REPORT

Of the Agricultural condition of the town of Cicero.

ESTIMATED PRODUCTS.

	Acres cultivated	Quantity of seed per acre.	Quantity raised per acre.	Cost of cultivation per acre.	Time of sowing or planting.	Kinds produced.	Profit per acre.
Wheat,	500	1½ bushels.	15 bushels.	$6 00	Sept. 1.	Mediterranean.	$9 00
Barley,	150	2 "	16 "	4 00	April 20.	2 rowed.	4 00
Oats,	2,000	2½ "	25 "	4 00	May 1.	White.	5 50
Rye,	100	1½ "	15 "	4 00	Sept. 1.	"	7 25
Buckwheat,	200	½ "	10 "	2 00	July 1	Common.	3 00
Indian Corn,	1,200	⅝ "	28 "	6 25	May 10.	8-rowed Yellow.	7 75
Flax,	.....	.....	.....	.....	.....	.....	.....
Hay,	2,000	¾ "	1½ ton.	2 00	April 15.	Timothy & Clover.	6 75
Potatoes,	250	12 "	100 bushels.	15 25	April 20	Various.	34 75
Root Crops,	8	1½ lbs.	300 "	25 00	May 10.	"	50 00
Pod Fruits,	100	4 bushels.	15 "	5 00	May 25.	Canada Peas.	2 50
Grass Seeds,	10	.....	3 "	2 00	.....	Timothy.	7 00
Dried Fruits,	100 bush.	.....	.....	25 c. pr. bush.	.....	Apples.	.....
Maple Sugar,	....	.....	.....	.....	.....	.....	.....
Apples,	200	.....	125 "	5 00	.....	Various.	26 25
Pears,	....	.....	.....	.....	.....	.....	.....

Potatoes have not been diseased the past season, but owing to the drought the yield was small.

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	No of lbs.	No. of cows in milk.	No. of fowls.	No. of Eggs.	Hives of bees.	Lbs. of honey.
Butter,.....	115,200	1,800	.....	.....	.....	.....
Cheese,.....	44,000	.....	.....	.....	.....	.....
Poultry,.....	.....	.....	16,000	.....	.....	.....
Eggs,.....	.....	.....	.....	150,000	.....	.....
Bees, ...	.....	.....	.....	.....	100	2,000

The dairy is on the increase, and dairymen are improving in the manufacture of butter and cheese.

Live Stock.

	Number.	Breed.	Average weight of fleece.
Bulls,.....	28	Native.	.....
Cows,.....	1,800	"	.....
Steers,.....	420	.....	.....
Oxen,.....	150	.....	.....
Heifers.....	380	.....	.....
Calves,.....	250	.....	.....
Bucks,.....	100	.....	5 pounds.
Ewes,*.....	1,600	.....	3½ "
Lambs,.....	900	.....	.....
Horses,.....	700	.....	.....
Swine,.....	1,400	.....	.....

* Mostly coarse wool.

But little attention has been paid to the breeds of horses and cattle.

Manures—Barnyard and stable. Plaster on our driest ground.

Wages.—$144 per year and found; $12 per month; $3.50 per week; 75 cents per day.

QUARTUS WELLS.

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AGRICULTURE OF OSWEGO COUNTY.

Mexico, Oct. 31st, 1849.

MR. B. P. JOHNSON, *Secretary, &c.:*

I have received your circular naming me "one of the county committee of Oswego county, to aid in endeavors to improve the agriculture of the State, and in procuring information of the agricultural productions of the county, which are most important."

I regret I cannot now present all the information you solicit in your fifteen queries, for the want of a county and town statistical organization, so desirable for this purpose; I will, however, endeavor to reply to them in the order you propose, with some general remarks on plank roads and railways, both so desirable to the farmer.

On a former occasion, (see Transactions for 1847, p. 721,) I gave, at your request, a view of the marked change and improvement in the application of the agricultural labor of this county, to the business of the dairy, in preference to raising grain, by which there is an increase in the wealth, as well as the comfort of our farmers. I would confirm, and refer to the statements then made, as containing much of the information solicited in your first query.

Since 1847, we have completed two plank roads through our county at right angles, intersecting each other near its center, at Union Square. The one north and south leads from Jefferson county on the "old State road," to the Erie canal, and to the railways at Syracuse. The other, east and west, from Oswego through this place to Rome. The completion of these two important works has given a new impulse to our agriculture, and to the business of the dairy of this heretofore secluded county. It became so on the construction of the Erie canal, which event drew off the current of population to the more esteemed grain growing region of Western New-York. We find these plank roads an admirable improvement on the old turnpike. They are destined, in my view, to be the pioneers and the aid to a system of well-constructed freight railways over our entire State. This is certain to take place where canals cannot penetrate, even if they could now compare with "the better improvement of the age," in the facilities they offer to the agriculturist and to the man of business, of certainty and celerity at all seasons of the year.

These improvements are drawing back to us our population, and creating a new and profitable business in the dairy. Railways are not

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impeded by the droughts of summer, nor are they stopped by the ice and snows of winter. They are overcoming our Alleghany mountains, where canals cannot be constructed; thus commencing a new era in the transportation of articles that cannot be conveyed on canals. In the winter they will open a way to the "granaries of the United States," so desirable to supply the first demand from Great Britain. With railways for winter transit, and the cheap production of wheat on our rich prairies, abounding with the deposit of rich vegetable and animal manures, we can compete with the continent of Europe in supplying the British market, on any failure of the English crop, ere the ports of the Baltic can be opened. I believe it admits of demonstration, that with our labor saving machines, cheap and rich lands, almost without taxes, we can compete with the farmers even of Great Britain, in the cost of placing a bushel of wheat in Mark Lane, London. We certainly can do it, taking into consideration that the English farmer has to pay on the average, about eight dollars per acre per annum, for the rent of his arable land, and a larger sum to manure it, with poor rates and church taxes, to an amount that he must receive $1.50 per bushel in London for his wheat, to compensate him for his labor.

One dollar and fifty cents, in London, per bushel for wheat, will pay a profit to the western farmer, forwarder and ship owner, whilst this sum will scarcely remunerate the producer and shipper, from either the Black Sea, the Baltic, or any part of the continent of Europe.

The cheap, but inferior wheat of Russia, shipped from the Black Sea, by the long voyage of the Mediterranean, cannot compete in the London market with our wheat, as their vessels have but one freight, towards a market, whilst we have freight both ways. This is an important consideration, when we come to a close competition with Russia in supplying any deficiency in Great Britain. Then railways to our prairies cannot be dispensed with. The long voyage from Odessa, through the heated waters of the Mediterranean, causes many cargoes to grow and perish by the delays incident to a passage through the Straits of Gibraltar, where a strong current is always setting from the Atlantic to the Mediterranean, while the wind only blows two ways, east and west, and often for long periods. Cases are known to me, when in the grain trade at Cadiz, that after the arrival of a vessel with wheat at Gibraltar, the active captain, by promptly taking advantage of the first slight "levant," or east wind, to get through the strong current of the straits, setting in from the west, neglected but a few hours by his more sluggish consort in the fleet, it has enabled the one, with

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the westerly wind he met, after the passage of the straits, to go to England and return to Gibraltar, there to find the windbound cargo of his companion spoiled by delay and not fit for starch on its arrival in England, from its malted and grown state.

The advantages our farmers will possess by railways to the west, and with steam navigation across the Atlantic, place the regulating market of Europe for grain, (Mark Lane,) within fifteen to twenty days of the valley of the Mississippi. This being so, the moment the British market requires a supply, from failure or injury to the crop by rains, it will be furnished by our enterprise, and, as I contend, on better terms than it can be supplied by serf labor on the worn out lands of northern and southern Europe, or on the expensive and heavily-taxed lands of Great Britain. Time and experience, I think, will prove the correctness of this position, and if so, how important is an unbroken line of railways to St. Louis, to enable the city of New-York to have her share of the winter traffic in wheat, now that the completion of the Central railway of Pennsylvania is secured, and also the Baltimore and Ohio railroads within two years and with its extension to St. Louis in four years.

To continue the subject of the improvement of our means of transportation, and, as a natural consequence, the agriculture of our county. On the north of us, we have a railway in the course of construction from *Rome to Cape Vincent*, passing through Williamstown, Albion, Richland, and Sandy Creek, with Mexico, our principal dairy towns. On the southwest we have completed the Oswego and Syracuse railroad through Hannibal, Granby and Lysander. These roads now form continuous lines to Boston, and I trust soon to the city of New-York, on the completion of the Harlem and the Hudson river railroads. It is true there is one railway, the Housatonic, completed, via. Bridgeport, and the New Haven railway to New-York, making three railways parallel to the Hudson river, within a distance of 30 miles.

The competition between railways and canals, and I may add, with the North river, is sure to introduce accommodation. With it, in due time, will come the ice or refrigerator car, so necessary to carry our fresh butter, provisions, salmon and other fish from Lake Ontario. When these continuous railways are opened to New-York, it is hoped our farmers will send representatives to our Legislature to protect their true interests. They will, I trust, insist upon a repeal of the present tax on private enterprise and capital, when it comes in competition with the State canals.

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The Erie canal, unique in its character, uniting inland seas with the ocean, has made the grain-growing districts of New-York, "to bloom and blossom like the rose." It is safe, however, to predict, that the construction of railways through the grass lands of southern and northern New-York, particularly the Erie railroad and its branches, is sure to produce like results to the dairy region in the southern tier of counties. A level or descending freight railway from Buffalo to Albany, a work easy to be accomplished, over which a single engine can draw in a single train, 1,000 tons, is much wanted to connect us with the States of Ohio, Michigan, Illinois, Indiana, and finally the Pacific.

There is hardly any conceivable limit to the production of grain on our prairies; and with railways, I repeat, at compensating prices, we can compete in London with the north and south of Europe. The London market has been the regulator of ours, even for the limited quantity of wheat that is occasionally required, but which has been steadily on the increase for a long period of years, to wit, from the year 1760, when it was 752,712 bushels to 7,264,844 bushels.

The true dairy region of the United States is confined mainly to the streams and side hills of the several spurs of the Alleghany mountains that drain into the Atlantic, north of the Chesapeake. It is, I believe, a well established fact that the cow must have access to pure water, in addition to sweet pasture, to produce the richest and most milk; shade, too, is important, and is too often neglected in our war upon the forest. The cow seeks the pasture of white clover, so natural to this county, with the dew of the morning on it, with the shade tree and water at noon. Taking this view, with the superior value of dairy farming over grain growing in this State, may we not look forward to the day as not distant, when plank roads and railroads will penetrate the now despised lands of "John Brown's tract," as well as the dense forests east of it, so well adapted to grass and the dairy, and be the means of their settlement, and the support of a healthy and wealthy population.

It is but a few years since, and within your and my recollection, the land, in the north part of Oneida county had but little value in public estimation. The first settlers in Boonville and Remsen, could not raise corn to compete with their southern neighbors in the same county, to make into whiskey, by the mode of farming before, and even after the Erie canal was completed. A small settlement of Welch, in the above named towns, some twenty-five years ago, from their success in making good butter of uniform quality, has changed the whole farming system in the counties of Oneida, Otsego, Lewis, and Herkimer. The farmers in these counties have changed from the plow to the milk pan, with

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eminent success. They have doubled their capital, by the aid of their sons and daughters. They have now money to lend, instead of being under the whip and influence of the banks; a case not unfrequent in Oneida county in former times.

The following table, made up from an official "statement of tons of butter and cheese shipped at each office on all the canals of this State, and from other States, for the years 1846 and 1847, and also the tons from this State, and from other States and Canada separately," shows conclusively the true butter and cheese region of this State, and I may add, of the United States. This table represents the butter and cheese from Jefferson and St. Lawrence counties, of the State of Vermont, by the Champlain canal; and from Ohio and other western States, received via Buffalo, on our canals.

It is true we have not the returns of butter and cheese from Orange, Ulster, Dutchess, Delaware, and Greene, as these counties are off from our canals. We know, however, that the farmers in those counties have grown rich by supplying the New-York market with fresh butter, at high prices, from its uniform quality and good name. The day is not distant, I trust, when our apt dairymen, from the lessons they are receiving from emigrants from the above named counties, and particularly from Herkimer, with the information to be derived from your labors on the subject in the late volumes of the State Transactions, will make as good "Navy butter" as Orange county; and that they will be enabled to deliver it daily in Center market, New-York, from the cars, on the completion of the Harlem and Hudson River railway up to Albany and Troy, there to connect with us and the west.

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TABLE

Showing the whole number of tons of Butter and Cheese shipped at thirty-six Canal offices of all the Canals of the State, for the years 1846 *and* 1847, *and also the tons from this and other States, and Canada, separately.*

1846.				1847.			
TONS BUTTER.		TONS CHEESE.		TONS BUTTER.		TONS CHEESE.	
From New-York State.	Other States and Canada.	From New-York State.	Other States and Canada.	From New-York State.	Other States and Canada.	From New-York State.	Other States and Canada.
8,920	2,258	15,417	3,516	8,236	3,246	15,983	4,056
Shipped from Oswego, of the above total,							
1,259	73	2,432	1	1,248	6	2,443	.....
From Utica and Rome,							
1,994	.....	4,638	.....	1,723	.....	5,051	.....
From Buffalo and Black Rock,							
618	1,713	785	1,702	714	2,707	1,104	2,384
Shipped from the remaining 32 offices of all the Canals, other States and Canada,							
5,051	472	7,561	1,813	4,541	533	7,390	1,902

To Oswego and Oneida counties should be added Herkimer, in the exports. It will be perceived that Herkimer county, in 1847, shipped one-third of the 15,983 tons of cheese sent on all our canals, and with Oswego and Oneida, 12,136 tons, equal to four-fifths of all the cheese sent by the canals in this State; and three times the amount received from all the other States and Canada.

From Herkimer County,							
348	.....	5,066	.....	260	.....	5,315	.....
Shipped from 30 Canal offices, from other States and the Canadas,							
4,703	472	2,496	1,813	4,281	533	2,075	1,902

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The foregoing remarks will, I trust, serve as a reply to your first inquiry. From their length, and from the want of statistical information of the quantities of our different crops and the number of our animals, I am admonished to be very brief in my answers to your remaining fourteen inquiries. I will give replies to them in their order.

To the second I would state, that in this county it is estimated the yield of corn this year, compared with last, and other years, is but half a crop. Of oats we have not half a crop. Wheat and rye have given way to the culture of corn, oats, barley, and potatoes, the true crops for the farmer to raise in this latitude, on our soil, when, by a rotation, it is desirable to break up pasture lands.

With lime, it is true, he can raise good wheat; although I think it will be for his interest to sell his butter, cheese, beef and pork, and buy his flour and shorts at the Oswego mills, made from the cheap wheat of the west. To be independent, and to save transportation, I would have him raise a few acres of wheat for his own consumption every year, but not as a crop, to contend with the farmers of Michigan and other western States, in the sea-board market, or the very limited market of Great Britain.

3d. The yield of hay to the acre, varies from one to three tons. The average this year, will not exceed 1¼ tons. It is of a much better quality than last year.

4th, 5th, 6th. These queries are mainly answered in No. 2, with the exception of hay, which, in quantity, I estimate at full 20 per cent less than the produce of 1848.

7th. A severe and continuous drought this summer is the cause of the falling off of all our crops. It may be remarked that we have had an unusual number of easterly winds. The acclimatized spring and fall Black Sea wheat, is gaining favor with our farmers for their own use, from its being less subject to attack by the fly and rust. Many are returning to the cultivation of a few acres yearly, with a yield of from 20 to 25 bushels to the acre, with profit, as they save transportation of flour from the Oswego mills.

8th. The yield and size of our potatoes is less than last year, but superior in quality. One hundred bushels this year, where three hundred bushels have been raised to the acre in other seasons, is the estimated cop of this year.

9th. The potatoe is little, if any, so far, injured by the rot this year. All attempts to discover and ward off this disease with us, so far, has proved failures. I am inclined to believe with Mr. Goodrich of Utica, that it is in part to be attributed to the neglect of our seed, with a wet and cold state of the weather, when in blossom. As a general rule, I

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would prefer early and deep planting, but not by hilling up. I attach an account of Mr. A. Killam of this town, of a large yield from seedling potatoes, with his mode of culture, to procure seed of remarkable size and quality, for which he took a premium, of the State Transactions.* I would here remark that the Transactions are much sought after, and preferred by many to money premiums, at our county fairs. It is doing much good. Its next edition should be increased for the several counties.

10th. We make and consume considerable maple sugar in our new towns; a "sugar bush" is a great desideratum with a settler in the purchase of a wild lot. There is no means within my reach to give the quantity made, until the next census.

11th. The returns of butter and cheese for this year cannot now be made up. It is estimated that the quantity of both will exceed that of the last year, owing to a greater number of families going into the dairy business, from the remunerating cash prices at their doors, to wit: 5½ to 6¼ cents for cheese, and 12½ to 16 cents for butter.

The table herewith gives a view of the export of butter and cheese from this region during the years 1846 and 1847, through the canal at Oswego, as well as from other parts of our State, and other States and Canada using our canals. I am indebted to you for the following "statement of the butter and cheese received on our canals for 1847 and 1848, with the value of the same," by which a steady increase is perceived in the amount and value, as compared with 1846.

Statement of the Butter and Cheese received on our canals 1847 *and* 1848.

		Quantity in lbs.	Value.		Quantity in lbs.	Value.
1847.	Butter, ...	22,724,000	$3,408,756 00	Cheese, ...	40,844,000	$2,860,354 00
1848.	" ...	23,729,997	3,359,391 00	" ...	43,279,526	3,029,161 00
Total in 2 years,		46,453,997	$6,768,147 00		84,123,526	$5,889,515 00
1849.	Butter, ...	22,106,009		Cheese, ...	50,448,000	

From the return at the Auditor's office.

12th. The culture of fruit is improving. We want however more stringent laws for its preservation, or that our farmers will have well fenced and well filled gardens, with the fruits of the season in them. This course will prevent their children learning their first lesson in pilfering, in their natural desire for fruit, that too often lands them in a prison.

A Horticultural and Pomological Society has been formed in the city of Oswego, with the promise of being useful. Their two first exhibitions of flowers and fruits in July and September, did them great credit.

* See ante page 329.

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It is estimated by Mr. N. Goodsell of Rochester, that we have sixty different kinds of bearing pear trees in this county, and that as regards peaches, we can and have succeded in raising them in great perfection, up to the line of Salmon river, and particularly within a few miles of the lake, where the thermometer is seldom 8 degrees below zero. Mr. Goodsell remarks, that "it requires ten degrees below zero to destroy the buds."* Of apples we have a great number of the most approved varieties, with a constant market for them in the western States, shipped by the lake propellers. I refer you to a report on this subject of the committee on fruit for this county for 1848, published in State Transactions for 1848, page 725.

13th. Of horned cattle we have no class that predominates. The Devons are perhaps the most common, as they are preferred for the yoke. We are paying attention to our native breed as among the best milkers. The little black and white cow of the Mohawk Valley originally, I suppose, from the Holderness, is equal if not superior for milk to the imported stock from England. This I understand to be the fact, from Col. Wm. Crane, of Herkimer. "They eat less in proportion than the large imported cow, and their milk is richer and greater in quantity." Such is his experience with his dairy on several farms in Herkimer county.

14th. I cannot say much in favor of our horses, neither of the blood, or of their endurance, while the heaves is too general a complaint. They want the wind and the lungs of the broad chested Arabian and Barbary horse, or the mixture of both, in the hardy Andalusian of Spain. This last class, it is to be presumed, may be found in their descendants on our western prairies, and the pampas around Buenos Ayres. The Indian horse of upper Missouri is an animal of great endurance. What gave England her fame in blood horses and in her hunters? It was the Godolphin Arabian crossed with her large Norman mares. The hardiness and endurance of "grief" necessary to pass the deserts of Arabia, expands the chest and thus gives room for the lungs, with wind exhibited by large nostrils. I have seen the result of the cross in Spain giving an endurance to the horse of the contrabandista, or smuggler, in carrying heavy loads of tobacco over the mountains from Gibraltar, that would astonish our horsemen. The small horse of western New-Jersey will draw a larger load through its sands, to the sea shore, and with more ease, and with less fatigue, than the large carriage horses of Philadelphia or New-York. The cheapness with which a colt in this re-

* They are seldom destroyed in the southern sections of the State, it is said, unless the thermometer sinks as low as 16°.

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gion can be raised till three years old, and then sold at from $50 to $150; the latter prices are far the most saleable, if of good blood and shape, and makes this class of stock profitable to the farmer, where hay is generally $5 to $6 per ton. A farmer in the dairy business can do his work on 100 acres with a pair of mares, and generally turn off a pair of colts per annum, that after three years will sell, unbroken, for $200, that need not cost him but a little more than a pair of steers of the same age. It would appear in this county, that neither the construction of canals, or railways with the "iron horse," has diminished the demand or the price of good carriage horses for our cities and for farm work.

15th. Of sheep we have various kinds, but mostly the native mixed with the merino. The average yield of wool of this class does not exceed 5 pounds per head. We have some fine Saxony sheep that I think will average about three pounds per head.

In reply to your queries about the price of labor, I would state, that good farm hands get from $100 to $150 per annum. Day labor is four to five shillings and found. The price of labor is enhanced from the demand for coopers (a trade soon acquired,) to supply Salina and the Oswego mills with salt and flour barrels, to the extent of 1,500,000 barrels per annum. Coopers readily earn from $15 to $30 per month, and are boarded. The demands on this county are fast clearing up our dense forests. One establishment in Williamstown, Humphreys & Dodges, make barrels by *steam*, and turn out upwards of 300 barrels daily.

Respectfully submitted,

JOSEPH E. BLOOMFIELD.

SCHOHARIE.

From Hon. Austin Sexton.

Seward, January 19th, 1850.

B. P. Johnson, Esq.,

Dear Sir:—I received a communication from you some time last summer, requesting my aid to advance the cause of agriculture. I have received much benefit from the experience and practice of others, and would most cheerfully lend a helping hand to aid in the improvement of farming, did I but feel myself competent to do so; I shall, however, venture to make a few statements concerning the agricultural products of our county.

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Not having any statistical accounts, I can only give such general views as arise from my own observation. We have in this section of country a variety of soil in many farms which requires no small degree of skill to manage profitably. A part of the farm may be best adapted for grass, while another part may be more profitable for the raising of grain; so that many of us are compelled to raise a variety of products upon one farm. This is more especially the case with lands lying in the vallies. The hill lands, of which there is much the greatest quantity, have more sameness of soil; these lands a few years ago were considered to be of little value, but of late the "table has turned," it has been ascertained that they are the best lands for grazing we have. The grass does not "run out," as is the case on lands lying in the valleys below. Farmers occupying those hill lands have turned their attention almost exclusively to the dairy, from which they realize a liberal profit. The butter that is made upon these highlands is superior in flavor to that made in lower situations, and the quantity obtained from the cow greater. This is no doubt owing to several causes; the atmosphere is more cool, the soil being more natural for grass, it is no doubt sweeter and richer. The water is pure, being supplied from springs. Butter is the principal product of the dairy, very little cheese is made. Improvements are being made in the manufacture of butter; much care and pains are taken to produce a good article. The average quantity made from a cow I should judge to be about 130 lbs. The cows are mostly of the native breed, although in many instances slightly crossed with some English bull, so called. The Durhams have been introduced among us to some extent, but I cannot speak very favorably of them as milkers, I mean those called full blood. No doubt that a cross with the Durhams is an improvement as to size. The Devons are also here, but they make better working oxen than cows. There are but few large dairies; most of the farms contain from 100 to 150 acres, including woodland. From 12 to 15 cows and a team, together with from 10 to 20 sheep, can usually be kept during the year on about 75 acres of cleared land, and grain enough raised for home use. Most of the calves are killed soon after being dropped, as it is considered to be more profitable to use the milk for making butter, than to fatten calves, there being no convenient market to dispose of them. Hogs are fattened in these dairies to considerable extent; it is usually calculated that the milk of one cow after the butter is extracted, will fatten one hog with the addition of a little grain in the end; these, however, are taken early to market. The average price obtained for butter the past season has been about 15½ cents.

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As a general thing a few sheep are kept on the farm, the wool of which is manufactured into cloth at home for family use; the increase or lambs are usually sent to market. There are very few wool-growers in this section of the country. The most common breeds of sheep are the native, mixed with the Merino; still we have the Bakewell and South Downs, the latter, however, have but recently been introduced. I should judge from what experience I have had, the South Downs will prove to be the most valuable. The fleece, though rather light can by a little crossing with the Merino be made sufficiently heavy and fine for farmers' use, and then they are superior to fatten, especially to produce tallow. Where so few are kept upon a farm, they do remarkably well, and, I should think, average 3½ lbs. to the fleece, if not more. These remarks concerning the dairy are intended to apply to the southern and western portion of our county. The eastern and northern portion are as yet mostly occupied in raising grain; although the practice of keeping sheep will apply to all portions. I have no means to ascertain the number of cows or sheep that are kept, but the number of cows is greater than at any former period.

TIOGA.

Mr. R. Howell, of Nichols, in this county, furnishes the following statement relative to that town and vicinity:

The drought has been very severe the past season; there has not been so dry a season for 18 years. It terminated the last of September, since which time the rain has been unusually severe. The crops of Indian corn and potatoes have generally been secured in good condition; corn, in general, a light crop. The crop of potatoes is light, they are, however, of good quality, better than for eight years past. The tubers are large, and as mealy as they were previous to the disease which commenced in 1840 or '41. The potatoes on the lowlands have been much more affected than upon the high dry lands, when the disease prevailed. A crop raised in 1843 on the flats, a portion of which was gravel and clay soil, and a portion black muck, exhibited a striking difference. Those on the black muck were nine-tenths diseased and lost, while upon the gravel and clay soil not more than one-half were affected. The Merino variety has suffered less than any other. No remedy has been discovered. The crops of wheat and rye have been as good as for a number of years. The oat crop about half the usual crop.

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The fruit orchards have until within a few years been of the common varieties of fruit. Many are now of grafted fruit; of apples, the R. I. Greening, Fall Pippin, Talman Sweet, Black Gilliflower, Newtown Pippin, Golden Russet, Swaar, E. Spitzenburgh, Belfleur, Sops-of-wine, Seek-no-further, Sweet Bow, Juneatings, Vandervere, &c. The price of apples ranges from 10 to 50 cents per bushel. The completion of the N. Y. and Erie railroad will increase the value of fruit and probably double the price. Pears and peaches are only raised in a few localities. Plums are not much cultivated; cherries are cultivated to some extent. The large English variety that formerly did well has mostly run out; the trees were attacked with a disease that enlarges the limbs in bunches some three or four inches in length, which finally destroys the tree. Quinces are grown by most families in small quantities. Grapes are raised to a very limited extent, except the wild grape; currants are abundant.

The crop of hay has been light, though some meadows were very good. The grub has been very injurious to the grass, eating off the roots so that the sod would pull up easily. They were very destructive.

Spring-tooth Horse rake.

This implement has been introduced and has proved very satisfactory, especially on rough and uneven ground. It works well and is much preferred to the revolving rake.

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REPORT

Of the Agricultural condition of the town of Nichols, Tioga county.

ESTIMATED PRODUCTS.

	Acres cultivated	Quantity of seed per acre.	Quantity raised per acre.	Cost of cultivation per acre.	Time of sowing or planting.	Kinds produced.	Profit per acre.
Wheat, ...	1,544	1¼ to 1¾ bu.	18 bushels,	$7 00	Sept. 10 to 30.	Crate, Soules,.	$11 00
Barley,.....	30	2	20 "	4 00	April 25, ...	4 rowed, ...	8 40
Oats, ...	832	2 to 2½	26 "	3 50	May 5,.....	White & black.	4 56
Rye,.....	154	1½	14 "	3 00	Sept. to Nov.,.	Common,.....	4 00
Buckwheat,.....	450	3½	12 "	3 50	July 4 to 12, ..	Little gray,...	2 00
Indian Corn, ...	885	½	25 "	6 00	May 8 to 22,..	White & ye'low	6 50
Flax, ...	16	¾	*	3 00	May 5,.....	Common,.....	.....
Hay,.....	2,700	.....	¾ ton.	1 50	.....	Clover & timo'y	4 50
Potatoes, ...	220	10	90 bushels.	6 00	May 1 to 20,..	Pinkeye, &c.,.	16 50
Root crops, ...	4	2 quarts,	300 "	.....	July 4 to 10,..	White turnip,.	.....
Pod fruits,.....	36	4 bushels,	10 "	2 50	May 1 to 10,..	Maro'fat & J'nc	2 50
Grass seeds, ...	none for sale,	.....	.....	.....	.....	.....	.....
Dried fruits, ...	none, ...	.....	.....	.....	.....	.....	.....
Maple sugar,.....	none, ...	.....	.....	.....	.....	.....	.....
Apples.	494	.....	.....	.....	.....	Various kinds,.	25 00

* 8 bush. seed, 115 lbs. lint.

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Butter,	No. of pounds.	78,455
Cheese,	do	9,230
No. of cows in milk,		923
No. of fowls,		6,100
No. of eggs		73,200
Hives of bees,		530
Pounds of honey,		16,500

Live Stock.

	Number.	Breed.	Average weight of fleeces.
Bulls,	40	Native & Durham	.....
Cows,	923	do	.....
Steers,	300	.....	.....
Oxen,	280	.....	.....
Heifers,	250	.....	.....
Calves,	480	.....	.....
Bucks,	70	¼ to ½ Merino & Saxon.	
Ewes,	3,250	.....	2 ¾ lbs.
Lambs,	2,390	.....	.....
Horses,	435	Mambrino, ...	.....
Swine,	1,605	Berkshire, Grass.	.....

Manures.—Barn-yard, plaster and ashes.

Wages.—Per year, $96 to $150; $5 to $10 per month; 50 cts to $1 per day; females, 62½ cents to $1.25 per week.

Wheat and corn are the principal products, and the rearing of cattle for sale is attended to with success. The average crops for several years: wheat, 16 bushels; barley, 25; oats, 45; rye, 12; buckwheat, 22; corn, 44; potatoes, from 70 to 150 bushels; hay, from 1½ to 2 tons per acre; though many farms yield much more. The past season, from drought, has been unfavorable to grass and summer crops. Corn was injured, in some instances, by the grub. The wheat crop has not been affected by the insects. The rot has not been prevalent in the potato. Have not observed as to the kinds of weather which affected potatoes. Pinkeyes, Western Reds, Merinos, and Shawneys, usually raised.

Dairy.

The dairy business is on the increase. The yield of butter per cow, from 75 to 125 lbs. A majority of the farmers sell from 100 to 500 lbs. yearly; price, from 12 to 17 cents. Cheese, 150 lbs. per cow; price, from 6 to 9 cents.

Fruits.

The culture is increasing, and good varieties are introduced. From 300 to 700 bushels per acre.

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Cattle.

Natives are the most common; Short-horns have been introduced, and some Long-horns. Mr. Pumpelly, of Oswego, imported a Short-horn bull, a few years since, which was a very fine animal, and has been very useful; the quality of beef much improved from this cross.

Horses,

Are very good, from the Mambrino stock; others of the ordinary breeds.

Sheep.

Natives, mixed with Saxons and Merinos; some Bakewell and South Downs have been introduced, and are estimated as valuable sheep. Average weight of fleece, from 2 to 6 pounds.

The town of Nichols was taken from the town of Tioga, in 1824; contains 20,801 acres; nearly one-half now cleared or cut over; three-fourths is in a new state. The inhabitants are in a thriving condition, having mostly paid for their lands; and the farmers of the back settlements are drawing their produce now *to* the river, instead of *from* there, as formerly. The flats along the river vary from a few rods to half a mile in width. The hills attain an elevation of from 300 to 500 ft., and are good for grain or grazing. The price of cattle has been high the past year: oxen, from $85 to $100 per yoke; cows, $15 to 25; two years old, $15; horses, from $85 to $100; sheep, from $1 to $1.80. In my estimates I have been rather below, than above the actual prices.

R. HOWELL.

Nichols, December, 1849.

IMPROVEMENT IN FARMING.

The following valuable suggestions are from a letter received by us from the Hon. G. H. Barstow, who has long been a resident of Tioga county, and whose experience and standing are such as to give weight to his statements, if any thing was needed in addition to the remarks themselves:

But to return to the subject of farming. I think I should be willing to see, perhaps, a school or two established by the State, with a view to teach some of the principles of Agriculture in a scientific, as well as a practical way. I have not a great deal of faith in its very great success. It *may* arouse the attention of the higher classes of farmers, and their example will produce an effect upon their neighbors, to a certain extent. The progress of improvement will, necessarily, be slow, but if it *is*, *time will produce* a great change. Nothing is more important than

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improvement in farming. It is the great business of the great masses, and on that, rests all the other interests of society.

The great principles on which successful farming rests, are very simple. 1st. Improve your breed of cattle, horses, hogs, and sheep. This is done by selling off the poorest and keeping what is left better, and purchasing gradually, as your means will allow, a better breed. Cultivate your land by plowing it in the best manner, and get your crops in the ground in good season. Keep up your fences, and do not have your crops damaged for want of good ones. Leave no land barren, but make every acre as profitable as possible. Hire no laborer who does not earn the wages you pay him, and see that every thing is done on your farm in a proper manner, and at the right time. Get your crops into the barn or granary at a proper time, and in good condition, which many farmers fail of doing, and lose half their crops after they arrive at maturity. Never put off the work of to day until another day, if you can possibly accomplish it to-day. See to every thing, and take care that nothing is lost. Save all your manure, and endeavor to manage so as to have no poor crops. Take care not to ruin your land with crops, or in any way impoverish it. Be sure that you keep it in as good, or little better condition, than at any time heretofore. For myself, I must say, that the farm I occupy, I have occupied thirty years, and the crops were never so good on it as this year. I therefore consider that a farmer should never lose sight of the importance of keeping his land from running down.

These few plain notions, drawn up hastily, are easily understood. They are merely practical. There are many other simple rules which might be enumerated. Care and attention are indispensable; industry and economy must be used; and prosperity will be the result. Simply scientific rules will not be understood by our common farmers. On the whole let us take courage, that farming is improving, and let us each in his way, give all the encouragement we can.

YATES.

From CHARLES LEE, Penn Yan.

B. P. JOHNSON, *Secretary, &c.*

DEAR SIR—Agreeable to solicitation I herewith transmit you a report as near correct as was possible to arrive at under the circumstances, of the agricultural condition of Yates county for 1849; a task which to me has been of some considerable toil and perplexity, but nevertheless one of pride and pleasure.

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The agricultural products of this county, I am happy to say, are greatly improved, and as may be seen on comparing statistical tables, are from year to year, gradually on the increase, which may safely be accounted for in the existence of the three following facts, viz: the improvement of more land, deeper plowing, together with a more thorough tillage, the bringing into more general use improved implements and labor saving utensils, together with a more general dissemination of *science and intelligence*, and the application of the same to the soil.

Our farmers are becoming more and more particular in their farm management. Many are realizing the good effects from under draining; others are more saving of their manures, and a more becoming willingness on the part of all to test the many valuable farm implements, such as the drill, the cultivator, the reaper, and the many other aids to the farmer in the successful cultivation of his various crops.

Yates county is strictly a grain growing district, with a population of nearly, if not quite 22,000 souls, enjoying an improved soil of perhaps 150,000 acres of as good land as the Empire State can boast. The whole number of acres of land as returned by the assessors is 207,220. Taxable property, real and personal, $4,325,572; taxes $20,816. And in order to make it appear more conclusive, I will show you at a glance the gradual but certain, and in some instances the astonishing improvement in some of her principal products. I have compared the past year with those as exhibited in the last State and also that of the National census:

	1840.	1845.	1849.
Wheat crop,.....	352,000	403,069	627,402
Barley "	31,000	71,000	167,348
Oats "	161,000	224,673	268,046
Corn "	104,000	136,000	239,190
Sheep, ...	86,000	130,000	125,605

It will be seen from the above that there has been an increase of a very large per cent, with but the exception of the number of sheep returned this year and that of 1845, the principal cause of which undoubtedly has been the falling off in the price of wool.

The wheat crop of the past season has been unusually good, there has been every thing to favor and nothing to retard or destroy either in its growth or perfection; we have had no insect, rust, or other malady; the winter was measurably favorable, and the summer drought had the effect only to hasten the "harvest time." The kinds heretofore most approved have been the "Red chaff" and "Hutchinson," but they have of late been succeeded by the more bountiful and reliable "White

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flint" and "Soules." The crop this year will average about 18¼ bushels per acre; there are towns however, that far exceed this, that of Milo is 20¾ bushels, being the heaviest yield in the county; Middlesex is 20 bushels; Benton 19½; Potter 19½, and Jerusalem 19. The remaining towns will fall a trifle under the latter, and the entire crop of the past year shows an increase over that of the year 1845 of about 200,000 bushels.

Yates county is emphatically *the* barley county of the State; the Albany brewers, I am told, make a decided preference in our favor, and it is certain that in proportion to the size of the county, there is by far the greatest amount exported. The crop of this year is good, but perhaps not as large as those of previous seasons, perhaps owing chiefly to the summer drought; the crop however, has exceeded that of 1845 by about 95,000 bushels; it seems to be on the increase with us, while in many barley growing counties, particularly those east of us, it is decreasing. It is considered in this county to be the best, if not the most profitable spring crop; it generally leaves the ground clean, free from weeds, and loose, and is certainly not as much of an exhauster as that of either oats, flax or spring wheat; it is universally followed with winter wheat.

The corn crop of this county is never large; it is principally raised for home consumption, the fattening of pork and beef, and a very small proportion of the total amount consumed by distilleries. The crop of this year will amount to 240,000 bushels, and at an average per acre of less than 30 bushels. The towns of Milo and Benton will exceed that of the county average, the former by three and the latter by about five bushels. The "eight rowed yellow" seems to be the favorite with most farmers, but wherever the "long white flint" has been thoroughly tested, it has in almost every instance taken the preference; the only opposition to its cultivation is from the fact as is supposed, that it cannot contain as much fattening properties, which seems evident, from its color.

Oats with us is considered too much an exhauster of the soil to be cultivated for any other purpose than for home consumption. The crop however, shows well for our small county, being 268,000 bushels, and at an average of a fraction less than 30 bushels per acre. The "long white" is the kind most generally cultivated, but from the fact that it scarcely ever holds out weight, should be a sufficient cause to change, or seek for a better in some respects, if not in all. I think however I have discovered a remedy for the evil in the successful cultivation of a new kind, known and raised by me as the imperial oats. A few seeds in the winter of 1846 were received from the Patent office at Washing-

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ton, from which the crop of the past season will amount to over 100 bushels, and which I have now on hand for distribution among my friends and neighbors; the berry is short but remarkably plump and white, the straw not large, never having been known to lodge unless blown down by storms, and the yield per acre is good; but their chief merit is in their weight, being no less than 40 lbs. to the bushel, and as far as I have been able to test them, they are not disposed to deteriorate in any respect. The sample I send you, I trust you will find accords with my report of the same, which you will be good enough to distribute or make such disposition of as shall seem to you best.

Rye is not cultivated in this county to any amount, the soil is better adapted to other grains; it is not and cannot be made a profitable crop unless upon *light soils*, with which it seems a bountiful Providence has not seen fit to bless us.

The potato crop is moderate, from the fact of the unusually small amount under cultivation, farmers having been about discouraged in this crop from its annual and almost certain destruction by the rot, but thanks to the Giver of all good, the malady has been arrested, at least in the present crop, for not the first instance of the curse having been seen in the county to my knowledge. The number of bushels are 122,000, and at an average of about 80 bushels per acre.

The hay crop of the county as is usual is good, being about an equal amount of clover and timothy, the former cultivated upon the high or rolling lands, while the latter is confined almost strictly to the low lands and swails. The product will be 30,000 tons.

The propagation of good fruits, until a very few years past, has been a matter of secondary importance, but I am happy to say "a change is operating upon the minds of many," they are beginning to open their eyes and *mouths* to the subject, and through the medium of both it is to be hoped an impetus will be given to this branch of agriculture so ardently wished for, and to the general advancement of which your worthy society has already done so much, and to which the Pomological world are vastly indebted. The fruit crops of this county for the past season have been almost an entire failure. The spring frosts were effectual in the destruction of early fruit of every description; a few favorable locations were spared. Farmers are beginning to trim up, graft and otherwise improve their old orchards; others are setting out anew. The best and earliest varieties of peaches are beginning to be cultivated, together with other choice varieties, all of which may be accounted for in the fact that the "nurseryman is abroad," and scattering far and wide, while on his periodical pilgrimage, joys and benefits in great profusion,

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so that no man that has a rod square of land in these days of progress and plenty, can offer a good and sufficient reason that he cannot "set under his own vine and fig tree," and eat in peace the fruits of his labors.

From the fact of this being a grain growing district, the dairy must of necessity be a secondary branch of farm management; a very small portion of the butter manufactured is exported. The total amount however, according to the returns, will not fall much short of 40,000 lbs. being the product of 500 cows in milk. The cheese consumed in the county is mostly imported from other counties, there being none of any considerable amount manufactured.

There appears to be a general inactivity or want of pride among farmers in regard to both the introduction of the improved breeds or even the improvement of the native stock of the county. I am not aware that there is the first full blood Durham bull in the county; our stock, however, may be considered good, in fact, as good as native breeds in general. The horses are good, but none full bloods; the swine are quite inferior, and with but a slight prospect of improvement in that respect. I have thought frequently that if farmers would try the experiment of keeping an accurate account of the amount of corn one of their long, lank, lean and *ever-squealing grunters* consumes; then take the same amount, convert it into cash and expend the same in the purchase from some one of his neighbors of white, clean and well fattened pork of the most approved breeds, in my humble opinion he would be the gainer both in pocket and pork barrel.

Labor saving implements and machinery are becoming from year to year more generally used. A few of those most generally approved are Hussey's reaper, Hall's and Hathaway's thrashing machines, Benton's horse power, &c., the two latter having taken the first premium, (in their respective classes,) of the State Agricultural Fair and Cattle Show at Syracuse. There is quite a large number of varieties of plows in use in this county, but perhaps those most approved are the "Penn Yan" and "Buckeye," (or iron beam,) the draft of the former, according to the test applied at a "trial of plows" in August last, near Geneva, was 355 lbs., and the latter 372 lbs. Palmer's drill was introduced last year I think, for the first.

At the suggestion of Mr. Delafield, the worthy president of the Seneca county agricultural society, I have at some considerable labor, as far as was possible under the circumstances, succeeded in procuring the agricultural statistics of this county for the past year. The course adopted was to select one reliable and efficient man in each town, and

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he selecting one intelligent farmer in each school district, at the same time placing in their hands, the necessary blank forms. A few of the district marshals have failed to discharge their respective duties, and in consequence of which I have been compelled to resort to the next best and most reliable sources, and in some instances the judgment of competent men as to the several amounts of the agricultural products of their respective neighborhoods.

It is to be hoped that this matter will be pressed upon the attention of the Legislature at its next session, and some plan adopted by which an annual minute and reliable statistical report may be had of the agricultural doings of the several counties of the State.

The agricultural knowledge and general intelligence upon farm matters in this county is mainly owing to the wide spread circulation of agricultural papers and periodicals. The Genesee Farmer has a circulation of 250 subscribers, and that of the Cultivator of about 150. From this fact may be traced the gradual improvement from year to year in the agricultural condition of the county, together with the commendable zeal for neatness, order and economy so manifest in many of our farmers.

I have thus carefully enumerated the several branches embraced in what might be said to constitute the agricultural condition of this county, with a candor and fairness so requisite in a matter of this character, and which, I trust, will be not merly a matter of curiosity, but one of pride and profit, not only to us as a county, but to all throughout our proud State, who take an interest in the onward progress of agriculture towards its ultimate destiny.

CHARLES LEE.

Penn Yan, Dec. 28th, 1849.

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ESTIMATE

Of the principal products of Yates county, for 1849.

WHEAT.

TOWNS.	Acres cultivated.	Seed per acre.	Time of sowing.	Quantity raised per acre.	Cost per acre.	Kinds.	Whole quantity.
Milo,	4,920	1½	1st to 15 Sept.	20⅝	$10	Flint and Soule,	102,090
Starkey,	3,708	1⅝	" "	16½	8	do	61,182
Benton,	6,040	1⅝	1st 20	19½	10	do	117,780
Jerusalem,	5,050	1¼	" "	19	9	do	95,950
Potter,	4,200	1¾	" "	19¼	10	do	80,800
Barrington,	4,800	1½	" "	16	8	do	76,800
Middlesex,	3,500	1⅝	1st 15	20	7	do	70,000
Italy,	1,600	1⅝	10 20	15½	8	Spring, Hutchinson	24,800
	33,818						627,402

OATS.

Milo,	1,393	2	10th May,	35	$5	Common white,	48,755
Starkey,	878	2¼	do	31½	4	do	27,437
Benton,	1,920	2¼	do	30	4	do	57,600
Jerusalem,	1,670	2	do	28	4	do	46,760
Potter,	930	2	do	30	4	do	27,960
Barrington,	1,102	2½	do	27	4	do	29,756
Middlesex,	490	3	do	32	4	do	15,680
Italy,	560	2	15th May,	25	4	do	14,000
	8,945						268,046

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ESTIMATE—(CONTINUED.)

POTATOES.

TOWNS.	Acres cultivated	Seed per acre.	Time of sowing.	Quantity raised per acre.	Cost per acre.	Kind.	Whole quantity.
Milo,	191	10	20th May,	95	$7	P. eyes &c.	18,135
Starkey,	153	11	do	80	6	do	12,240
Benton,	275	14	do	100	6	do	27,500
Jerusalem,	310	12	do	95	8	do	29,450
Potter,	180	15	do	90	8	do	16,200
Barrington,	120	12	do	73	7	do	8,760
Middlesex,	100	10	do	50	7	do	5,000
Italy,	90	8	do	58	7	do	5,220
	1,419						122,515

BARLEY.

Milo,	1,445	2½	20 Apl to May	23 bu.	$4	6 rowed,	32,442
Starkey,	787	2¼	do	18	4	do	14,166
Benton,	2,400	2	do	20	4	do	48,000
Jerusalem,	1,020	2	do	19	5	do	19,380
Potter,	1,000	2	do	20	5	do	20,000
Barrington,	670	2	do	18	5	do	12,060
Middlesex,	00	2½	do	30	4	do	15,000
Italy,	350	2	do	18	5	do	6,300
	8,172						167,348

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ESTIMATE—(CONTINUED.)

INDIAN CORN.

TOWNS.	Acres cultivated	Seed per acre.	Time of plant'g.	Quantity per acre.	Cost per acre.	Kind.	Whole quantity.
Milo,	2,289	6 to 8 q'ts	10 to 20 May,	33½	$9	White and yellow,	76,682
Starkey,	706	do	15 "	30	8	Yellow	21,180
Benton,	1,920	do	" "	35	9	do	67,200
Jerusalem,	850	do	20 "	30	8	do	25,500
Potter,	609	do	" "	32	10	do	19,488
Barrington,	500	do	" "	28	9	do	14,000
Middlesex,	446	do	" "	20	7	do	8,900
Italy,	320	do	" "	19¼	7	do	6,240
	7,640						239,190

HAY.

Milo,	1,925	.....	.....	2 tons.	$1 25	Clover and timothy	3,850
Starkey,	2,083	.....	.....	1½	1 50	do do	3,124
Benton,	3,200	.....	.....	2	1 50	do do	6,400
Jerusalem,	2,950	.....	.....	2	1 50	do do	5,900
Potter,	1,400	.....	.....	2	1 25	do do	2,800
Barrington,	1,100	.....	.....	1½	1 25	do do	1,650
Middlesex,	1,010	.....	.....	1½	1 50	do do	2,020
Italy,	879	.....	.....	1½	1 25	do do	1,305
	14,537						27,049

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ESTIMATE.—(CONTINUED.)

TOWNS.	Cows in milk.	Lbs. butter.	Poultry.	Eggs (dozen.)	Lbs. Honey.	Bulls.	Cows.	Steers.	Oxen.	Heifers.	Sheep.	Horses.	Swine.	WAGES. Per mo.	Per day.	Per week females.
Milo,	1,072	107,200	10,000	8,300	4,800	48	1,140	327	148	266	18,000	1,020	4,100	$10 to $14	6s to 10s	$1
Starkey,	608	62,850	15,000	12,500	2,740	26	621	309	96	303	7,605	687	1,295	12.50	do	do
Benton,	1,320	118,800	18,110	14,000	4,300	63	1,380	520	70	400	20,000	1,300	5,200	10 to 14	do	do
Jerusalem,	1,880	188,000	10,000	8,000	6,400	33	1,900	440	163	420	25,000	1,027	3,031	10 to 12	do	do
Potter,	1,200	108,000	9,200	6,000	2,300	18	1,220	140	110	120	15,000	888	1,800	do	do	do
Barrington,	960	90,000	8,700	5,300	3,400	13	950	210	100	80	17,000	760	1,909	do	do	do
Middlesex,	560	50,000	8,000	6,000	1,500	10	400	100	93	111	15,000	750	600	12.50,	7s	do
Italy,	420	40,000	7,000	4,000	1,500	18	450	160	110	60	8,000	526	870	do	"	do
	7,900	764,850	86,010	64,100	26,940	229	8,061	2,206	890	1,760	125,605	6,958	18,805			

ABSTRACT *Of a Meteorological register, kept at Penn Yan, Yates co. for the year* 1849, *by* H. P. SARTWELL, M. D.

	Farenheit.	Rain guage.
January,	22°12	.57
February,	21.14	.54
March,	33.64	.85
April,	40.96	.48
May,	52.22	3.12
June,	64.63	2.20
July,	66.77	1.60
August,	67.22	1.69
September,	58.60	1.37
October,	46.32	6.29
November,	44.66	2.88
December,	25.92	1.38
	45°36	22.97

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IMPORTED CATTLE.

In the year 1849, I selected in England and imported thence, seven Short Horns for J. M. Sherwood, J. F. Sheafe and myself. As three of them were shown, and won prizes at the N. Y. State Agricultural Society's show at Syracuse, in September last, and as portraits of two of these imported animals will embellish the present volume of Transactions of the Society, I deem it proper to give some account of them. Their pedigrees are as follows; the figures referring to the Herd Book, in which the bulls are registered and numbered:

Red Rose, 2d, red in color, calved 1846, bred by Mr. John Stephenson, of Wolviston, Durham, Eng.; got by Napier (6,238), dam Tuberose by South Durham (5,281), grandam Rose Ann by Bellerophon (3,119), great grandam Rosette by Belvedere (1,706),—Red Rose by Waterloo (2,816),—Moss Rose by Baron (58),—Angelina by Phenomenon (491),—Anna Boleyne by Favorite (252),—Princess by Favorite (252),—Brighteyes by Favorite (252),—Brighteyes by Hubback (319),—Brighteyes by Snowdon's bull (612),—Dutchess of Atholl by Masterman's bull (422),—Beauty by Harrison's bull (292),—Tripes by the Studley bull (626). Tripes was bred in 1748 by Mr. Pickering of Foxton, out of a cow which he bought in 1729, when a calf, of Mr. Stephenson of Ketton. The female ancestors of Tripes had been bred by and in the possession of Mr. Stephenson and his father back to 1694, in which year Mr. Stephenson of Acklam, Yorkshire, bought his first cow of the tribe from the Aislabie family of Aislabie, in Durham.

Princess I, red, calved in 1846, bred by Mr. John Stephenson, the property of A. Stevens, got by Napier (6,238), dam Rose Ann by Bellerophon (3,119), grandam Rosette by Belvedere (1,706), great grandam Red Rose by Waterloo (2,816), &c., as in Red Rose 2d, above.

Princess II, roan, calved in 1848, bred by Mr. John Stephenson, the property of A. Stevens, got by General Sale (8,099), dam Duchess by Mr. Bates' 4th Duke of Northumberland (3,649), grandam Rosette by Belvedere (1,706), great grandam Red Rose by Waterloo (2,816), &c., as in the pedigree of Red Rose 2d, above.

Princess III, roan, calved in 1848, bred by Mr. John Stephenson, the property of A. Stevens, got by Napier (6,238), dam Rose Ann by Bellerophon (3,119), &c. She is full sister to Princess I.

Red Rose 3d, roan, calved in 1848, bred by Mr. John Stephenson, the property of J. M. Sherwood, got by Gen. Sale (8,099), dam Maid of Orleans by Mameluke (2,258), grandam Helena by Waterloo (2,816),

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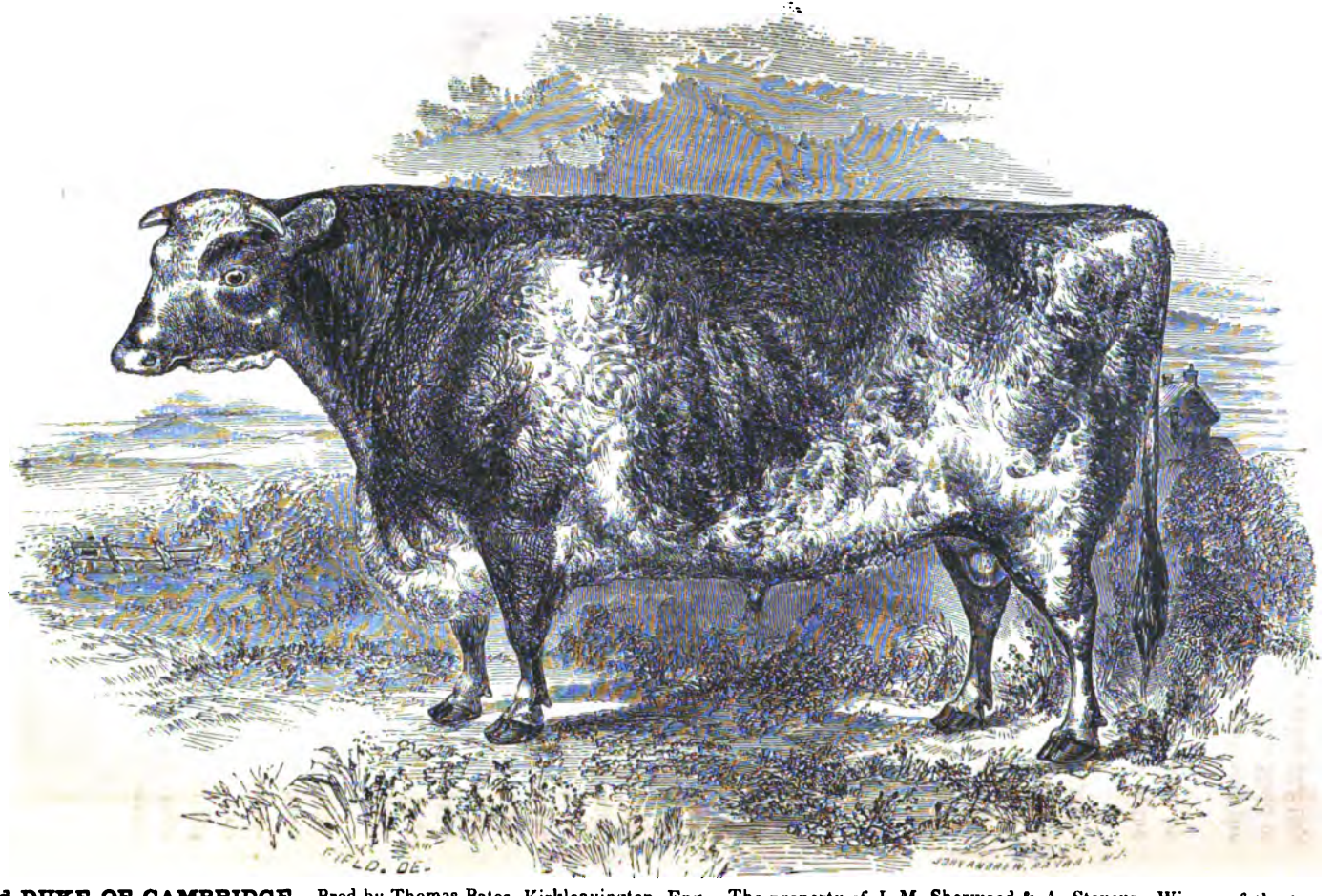

3d DUKE OF CAMBRIDGE. Bred by Thomas Bates, Kirkleavington, Eng. The property of J. M. Sherwood & A. Stevens. Winner of the 1st Prize for Bulls in aged class of Short Horns, at Syracuse, 1849.

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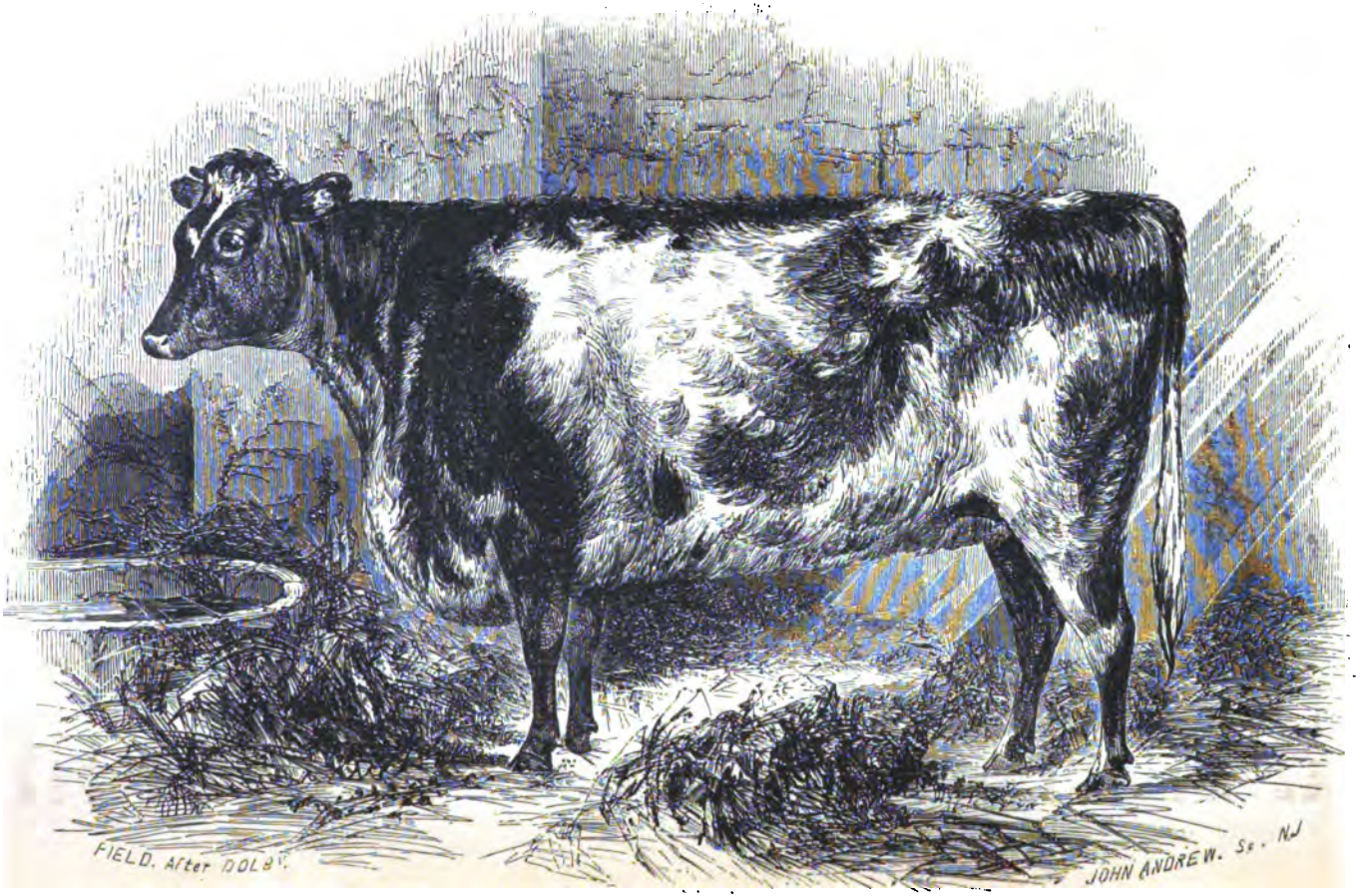

A SHORT HORN HEIFER. The property of A. Stevens.

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great grandam Moss Rose by Baron (58), &c., as in pedigree of Red Rose 2d, above.

3d *Duke of Cambridge* (5,941), roan calved 1841, bred by Mr. Thomas Bates of Kirkleavington, Yorkshire, the property of J. M. Sherwood, and A. Stevens, got by Duke of Northumberland (1,940), dam Waterloo II by Belvedere (1,706), grandam Waterloo I (bred by Mr. Parkin, of Thorpe,) by Waterloo (2,816), great grandam Lady Antrim by Waterloo (2,816),—Anna by Lawnsleeves (365),—Angelina by Phenomenon (491), &c.

Waterloo V, roan, calved (1841), bred by Mr. Thomas Bates, the property of A. Stevens, got by Duke of Northumberland (1,940), dam Waterloo III by Norfolk (2,377), grandam Waterloo I by Waterloo (2,816), &c., as in the pedigree of 3d Duke of Cambridge.

Mr. Stephenson bred the bull, *General Sale*, (8,099), by Napier (6,238), out of Rose Ann by Bellerophon (3,119); *Napier* (6,238) by South Durham (5,281) out of Rosette by Belvedere (1706); *South Durham* (5,282) by Belvedere (1,706) out of Helena by Waterloo (2,816); *Bellerophon* (3,119) by Belvedere (1,706) out of Helena by Waterloo (2,816): *Belvedere* (1,706) by Waterloo (2,816) out of Angelina II by Young Wynyard (2,859), grandam Angelina by Phenomenon (491); and *Waterloo* (2,816) by Young Wynyard (2,859) out of Angelina by Phenomenon (491). Mr. Stephenson also bred *Angelina II*, the dam of Belvedere (1,706).

Young Wynyard (2,859) by Robert Colling's Wellington (680) out of Princess by Phenomenon (491), was bred by the Countess of Antrim, widow of Sir Henry Vane Tempest.

The ancient family of the Aislabies, which came into England from Normandy with William the Conqueror, established themselves, prior to 1300, at Aislabie, on the river Tees, in the county of Durham, and the manor, their estate, was called after the family. As early as 1600, the family was known to possess a most extraordinary tribe of cattle. In the reign of Charles I., the then Lord of the Manor married the daughter and heir of Sir John Mallorie of Studley, in Yorkshire, and on the death of Sir John, the daughter, Mrs. Aislabie, succeeded to the ownership of the Studley estate. Mrs. Aislabie and her husband went to reside at Studley, while the younger branch of the Aislabie family continued to reside at Aislabie. Finally in 1684 the younger branch of the Aislabie family parted with their estates in Durham. At the time Sir John Mallorie's daughter, Mrs. Aislabie, took possession of Studley, the cattle of Aislabie were in part transferred from Durham to Yorkshire, and the remainder in 1684.

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Prior to 1684, the Pennimans of Ormsby, in Yorkshire, had procured cows, and had used bulls from Aislabie; and after 1684 used bulls from Studley. In 1684, Mr. Stephenson of Acklam, near Ormsby, bought a cow from Mr. Aislabie, just before the sale of the Durham estates and the transference of the cattle thence to Studley. After 1684, he sent cows to Studley to be served, and used bulls from Studley in possession of the Pennimans. In 1731, Mr. Stephenson, junior, (son of the one named before,) removed from Acklam to Ketton in Durham, and took with him the cattle descended from the original cow got at Aislabie; and he took no others than those so descended in the female line only.

About 1700, a Miss Aislabie of Studley, married Mr. Milbank of the Barmingham family of Barmingham, in Yorkshire, and through this marriage cattle from Studley went to Barmingham. From Barmingham, Mr. Sharter of Chilton, near Ketton, got cows, and hired bulls, and from them bred the celebrated Studley bull, (626).

Mr. Pickering lived at Foxton, near Ketton. In 1739 Mr. Stephenson of Ketton, sold to Mr. Pickering a young cow and her heifer calf, descended on the dam side from the Aislabie tribe of cattle. Mr. Pickering used the Studley bull, and out of the heifer got from Mr. Stephenson of Ketton, when she became a cow, bred in the year 1748, the cow Tripes. In 1756, Mr. Pickering sold Tripes to Mr. John Hall of Haughton. Mr. Hall bred Beauty got by Harrison's bull (292), out of Tripes; and out of Beauty he bred Duchess of Atholl, got by Masterman's bull, (422). Mr. Alexander Hall, on the death of John Hall, his brother, succeeded to his estate; and he bred Brighteyes by Snowdon's bull, (619), out of Duchess of Atholl; and out of Brighteyes by Snowdon's bull he bred Brighteyes by Hubback. Brighteyes by Hubback was sold by A. Hall to Robert Colling. Robert Colling bred Brighteyes by Favorite, (252), out of Brighteyes by Hubback, and out of her Princess by Favorite. Princess was sold by him to Sir Henry Vane Tempest of Wynyard. Sir Henry bred Anna Boleyne by Favorite, (252), out of Princess; and Angelina by Phenomenon (492), out of Anna Boleyne. Sir Henry died in 1813, and his widow, the countess of Antrim, bred in 1816, Anna by Lawnsleeves (365), out of Angelina. In 1818 she sold Angelina to Mr. John Stephenson of Wolviston, great grandson of the first Mr. Stephenson of Ketton. All the sires and dams in the pedigrees of these imported cattle which were bred by Mr. John Stephenson, occurring after Angelina, were bred by him.

Such is the history of these cattle. I think the portraits of 3rd Duke of Cambridge and Princess III will be admitted by those who have

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seen the animals not to be flattered. That of Princess III. was taken when she was eleven months old; that of Cambridge when he was seven years old.

Cattle to be good must have quality, which consists of good handling and plenty of lean flesh. Quality requires for its existence, as a connection, good hair. Hair to be good must be long, woolly or mossy, and abundant. It will be seen that the portraits of Cambridge and Princess show hair that is *long*, *mossy* and *abundant*. This characteristic goes with the family; and in quality no tribe ever exceeded them.

A. STEVENS.

NOTE.—The history of the Aislabie family may be found in Hutchinson's, in Mackenzie's, and in Surtee's history of Durham—and the history of the Mallories and the Aislabies in Yorkshire, in Bigham's history of Yorkshire; and the facts in reference to the Stephensons, from the papers of the late Dr. Stephenson of Kelso, who was born at Ketton, and what relates to the Halls, from those of Alexander Hall, lately deceased.

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COUNTY SOCIETIES.

The usefulness and importance of the county associations are more manifest every year of their existence. The reports which are furnished the present year are far more valuable than those of any former year. They are interesting to a very large class of farmers and others in their operations, and their annual exhibitions call together in the several counties large portions of the population who are deeply interested in the progress which is making in the agricultural interest. It is not alone by the improvements exhibited in the various departments of agriculture, that these annual meetings are useful. Here the farmers meet together and have free intercourse with each other, and from their interchange of sentiment and opinion, they mutually stir up one another to more systematic and energetic measures in the pursuit of their profession. We have no where seen exhibited more strikingly the advantages of these societies than in the following remarks of the Hon. Daniel Webster, of Marshfield, Mass., at the Fair of the Norfolk Agricultural Society. He says: "The great practical truth and characteristic of the present age is, that great public improvements were carried out by means of voluntary association. This principle—the principle of voluntary association—of bringing minds together to act upon each other, is the great principle and truth of the age. Its germ, to be sure, was to be seen centuries ago in the old world. It was to be traced in the establishment of cities in the feudal age; it was still further extended in the professional associations of Europe at a subsequent period. But it has been long—both in the old country and in this—before the idea was brought to bear upon agriculture and the tillage of the soil. The reason of this was obvious. Merchants, traders and others, congregating in large cities, could meet together at almost any hour, summoned by the peal of almost any bell, to interchange their sentiments on any topic of moment.

"Not so with farmers. They were scattered all over the country; their labors were mostly solitary—here upon the plains, and there in the

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deepest recesses of the hills; they have no exchange, no coffee house, no lyceum, where they could assemble together conveniently. Such too, in a great measure, was the case with them now; and hence it had become essential that these annual fairs should be held. Hence the necessity that they should be universally attended—not so much for the sake of the exhibition, or of any discourses to be delivered, or lectures to be given, *as for the sake of interchanging sentiments, of comparing the experience of one with another; of mingling together and keeping up a communication of ideas.* Every man obtained a great part of whatever knowledge he might possess, by conversation and communication with others. Books, indeed, might do something in this respect, but nothing in comparison with the communication. If we deduct from the aggregate of each man's knowledge, whatever he had learned by communication and conversation with his fellow man, very little would be left, and that little not worth much at best. It was intercourse with each other that made man sharp, and active, and enterprising; and, therefore, if there should not be at any annual exhibition of an agricultural association, a handsome pair of steers, or a likely cow, in the whole county, *still, if there were the men assembled together in social intercourse*, then, he said, the exhibition would be productive of much good."

AGRICULTURAL EDUCATION.

The subject of an Agricultural College and experimental farm, is favorably noticed in the returns and addresses from most of the societies in the State. An increasing interest is manifest in the subject. An education adapted to the agricultural profession, is becoming with the farmers of the State a matter of paramount importance. It is viewed as necessary not only, but the time has arrived when measures should be adopted to ensure its speedy accomplishment on a scale worthy of the State, and commensurate with the wants of the farmer. The farmers and mechanics of the State have but to manifest their desire in a manner that shall satisfy the Legislature that they are truly in earnest, and the work will not be long delayed. We would urge upon every association in the State to give to this subject early attention, and by efficient effort, send up their applications in such numbers as to satisfy all that they feel the deep importance of the subject, and of their desire that early measures should be adopted to put in successful operation an institution that will, under proper management, accomplish in due time the great objects they have in view—the improvement of Agriculture, and a complete education for the farmers and mechanics of the State.

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ALLEGANY.

The Allegany County Agricultural Society held its annual fair at Angelica, on the 10th of October; it was quite numerously attended. Many gentlemen present manifested an ardent desire for the success and prosperity of the society, and expressed their earnest wishes for the promotion of the agricultural interest of the county. The exhibition of the various animals, and other articles usually exhibited on such occasions, was creditable to the society. The horses, cattle, and sheep afforded fine specimens of the different breeds.

The domestic manufactures and choice vegetables exhibited left no room to doubt the skill and ingenuity with which the former were fabricated or the latter cultivated. The exhibitions of the day, together with the deep interest manifested by our citizens in the improvement of the various branches of agriculture, as well as domestic manufactures, give a cheering hope that the most beneficial results will attend the future operations of the society.

Owing to the existence of several causes, Allegany has not been able, at the agricultural fairs, to make that rich and dazzling display that has characterized the fairs of many of her sister counties. A very great portion of our lands are as yet covered with dense forests. The vast quantity and superior quality of our pine and oak lumber engross the attention of capitalists and the more enterprising portion of our citizens. The quantity of lumber annually manufactured is immense; and the number of men and teams engaged in its manufacture and transportation to market create so heavy a draft upon the laborers, that the cultivation of the soil is neglected to a very injurious extent. The large profits realized from the manufacture and sale of lumber, and the immediate returns received by those engaged in the business, enable them to pay the highest wages, and command the service of nearly all the laboring men. To such an extent is this monopoly of working hands carried, that the farmer is left at his option, to have his lands cultivated at a price that will swallow up all he can raise, or let such of his fields as he cannot cultivate with his own hands, run to waste. These causes operate most injuriously upon the agriculture of the county, and have induced abroad, an unfavorable opinion of the quality of our lands. This explanation is due to a soil naturally prolific, and which if properly cultivated, would rank high in the scale of production. It is believed that the causes mentioned as retarding our agriculture, are about to be removed.

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The Genesee Valley Canal passing from north to south, through nearly the entire extent of the county, is now in the progress of rapid construction, and the completion of the New-York and Erie railroad, which will pass through its entire extent, from east to west, is anticipated to be near at hand. The completion of these works will form a new era in the agriculture of the county; they will cause our large forests to disappear, multiply the tillers of the soil, and afford us such facilities for marketing our produce, that agriculture will become the staple business of the county. When we shall have realized these anticipated results, we flatter ourselves, that Allegany will become strong in agricultural wealth and productions, and be able to make as fine a display at her fairs, as most of her sister counties.

During the past year, our crops of hay, wheat and Indian corn have been good; our meadows have yielded, on an average, over a ton and a half to the acre. It is believed that the average of wheat has not been less than about seventeen bushels to the acre, and that the average of Indian corn has been about thirty to the acre. Some fields of wheat that have been thrashed and measured, turned out over thirty-five bushels to the acre on the average, and some fields of corn have averaged as high as from seventy-five to eighty bushels to the acre. There has been no report of the yield or culture of any field crops made to the society. The information as to crops, as above stated, is derived from reliable individuals, some of whom are members of the Society, and others not.

The amount of premiums awarded and paid by the Society for the past year, is $150, besides books. The balance in the hands of the treasurer carried to new account, is $180. Our annual meeting for the election of officers will be held in February, a report of which will be forwarded. W. G. ANGEL, *President.*

Officers 1850.—James Wilson, Jr., President; A. B. Heckman, Amos Pervin, E. B. Winans, Samuel P. Karr, John Simons, Robert Renwick, Jr., Vice Presidents; Ezra Starr, Secretary; James Lockhart, Corresponding Secretary and Treasurer, and ten directors.

CATTARAUGUS.

We take great pleasure in assuring you that during the past year there has been a decided improvement in the affairs of our Agricultural Society. Two days were fully occupied in its exhibition, which were witnessed by a large number of people.

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The first day was devoted to the show of domestic animals exclusively. The exhibition of horses, especially of matched horses, was better than that of any previous fair; that of cattle, though not as great in point of numbers, with previous shows, was decidedly superior in point of quality. Representatives of the different breeds, Durhams, Herefords, Devons, &c., were on the ground. The second day was devoted to the plowing match and the indoor exhibition. In the afternoon an excellent address was delivered by the Hon. F. S. Martin, of Olean, himself a practical and successful farmer. It was listened to by a large and respectable audience with much satisfaction, and, undoubtedly with much profit. There was not a large number of entries, which was probably owing to the fact that the subscription price was raised (for this year only,) from one to two dollars. The executive committee at their meeting in April, resolved either to raise sufficient money to pay off old debts and put the affairs of the society on good footing, and make it generally useful or to abandon it altogether. The result of their efforts shows a sufficient sum to pay off old debts, to pay the premiums awarded this year, and leave a balance in the hands of the treasurer of $100. The amount apportioned to us by the State, but $86,00, seems small, and is small, in comparison with the present condition of our county.

No county in the State has increased more rapidly during the past five years in agricultural wealth than this, and when its resources are fully developed it will rank among the first in the State. One cause of our rapid increase is, that within that period our farmers have turned their attention from the cultivation of grain to the making of butter, cheese, and the raising of a better description of horses and cattle. We have suggested to our sister societies in the adjoining counties, to hold our different fairs on successive days of the same week. It would be a stronger inducement to those having improved agricultural implements, or those who wish to purchase fine stock, to visit this section, when they can attend all these shows in a week, and we could more readily induce men eminent for their successful attention to the pursuits of agriculture, to deliver lectures among us, which would lead to more intercourse between the members of the different societies, that could not fail to be beneficial.

JOHN C. DEVEREAUX, JR., *Secretary.*

Officers, 1850.—John S. Harvey, President, John C. Devereaux, Jr., Secretary.

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Address of Hon. Frederick S. Martin.

We give extracts from this valuable address, embodying the early history of the county, and giving a most interesting account of its agriculture; the changes which it has undergone; its present condition and its future prospects.

Mr. President and Gentlemen:—In discharging the duties which your kindness and partiality have devolved upon me, I shall endeavor to render my remarks plain and practical, and for the most part confine them to the nature and designs of the society with which we are connected. An enterprise that should enlist the best feelings of the heart, and call into action the noblest faculties of the mind.

Agriculture, as defined by most writers, is the art or science of cultivating the earth in such ways as to cause it to produce in the largest quantities and in the greatest perfection those vegetables which are useful to man and to the animals subject to his dominion. Upon this foundation all the arts and sciences are more or less based. On this broad basis civilization erects her habitations, and the embellishments with which they are surrounded mark the age, the progress, the intellectual culture, and refinement of the inhabitants of all countries.

Farming at this time is now justly placed among the most useful and important occupations, and good husbandry is valuable to nations as well as to individuals, giving them a healthy and vigorous population, energy of mind and character, virtuous and temperate habits—tends to an acquisition of general information and intelligence—important to success in all business transactions. It induces all nations to deal justly, looking with a firm reliance to the Giver of all good for His blessing on their labors. These are deemed important to individual and national independence and good government.

The earth is termed our mother; from her bosom all draw their support. The rich, the poor, the bond, the free, the prince and the peasant, are equally dependent on her for the temporal blessings with which their daily wants are supplied. How important then its study; are we certain that we are not misled by the dim light of nature? Should we not give an impulse to the already awakened activity; study into the wonderful economy of Nature, its order and agencies?

An all-wise Providence has placed man here for some good. The sanctuary of Nature is thrown wide open, and he may fearlessly enter and partake of its blessings. The earth aided by sun and light, is en-

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dowed with capacities to produce vegetable matter sufficient to sustain and support life.

The useful and the beautiful are harmoniously blended—the former in the substantials necessary to a healthy condition of body, the latter in objects gratifying to the sight, as the soft blending tints of a far-off landscape, the shifting play of light over waving fields of grain, the meandering stream impatient of restraint, revealing a world of untold magnificence and producing as it were within us an ideal world, opening on the mental eye. It varies in form and properties, and its particles go to make up what we denominate soil. It appears to us a heterogeneous mass of matter, covered with vegetable and mineral remains, which by the wonderful economy of nature are undergoing change; at one time maturing, at another decaying and yet never lost. Were it not so, the earth would be constantly diminishing in size, and bounds set to its existence.

The vegetable may grow, mature and decay; collected to the bosom of the earth by its proper agencies, it affords nutricious food to the new organized plants. In its last stages of decay, the seed, from specific lightness, may be wafted to parts remote, and there germinate as in the parent soil; other particles floating in the atmosphere are again brought down in the refreshing shower—the more evanescent ones by the nightly dews. Whatever falls on the mountains gradually washes in to enrich and fertilize the valleys—whatever falls on the ocean affords support to its teeming millions.

The relation between vegetables and animals is of the most intimate kind: being mutually convertible, one into the other, and depending on each other for existence. In fact, they are the only natural means by which animal life can be sustained. And as all vegetable matter differs in form, we at once infer that every soil has its natural productions. On sandy portions of land the pine springs up spontaneously. On our low and wet lands, the spruce and willow; while our openings abound with scrub-oak and hazel. Soils charged with excess of moisture, rarely, if ever, produce plants desirable to man or beast; their tender and delicate fibres must have a lighter bed in which to repose, sufficiently dry to admit easily the rays of the sun. Timothy and red-top grow best in moist lands; but constantly saturated with water they soon run out, giving place to tufts of wild grass, destroying the beauty of the farm, and that which is of greater importance, the profits of the farmer.

Hence the first study of the cultivator should be the properties of the soil, enabling him to adapt the crop to its peculiarities. To prepare it in the proper season, and in the most economical manner; to give a pro-

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per rotation to the different grains and grasses; to ascertain approved breeds of domestic animals, which are useful for food, and necessary to aid him in his labors, and will produce the greatest profit in market; the improvements made in farming implements and modes of culture. These, and a great variety of matters which it is important for the farmer to make himself acquainted with, will give employment to his leisure hours; and the time thus spent will produce as profitable results as his more active labors in the field. Having made these general remarks on the subject of Agriculture, it may not be inappropriate to give a brief sketch of the early history of this county, and then pass on to the more practical part of the subject which has brought us together.

The first purchase of lands from the Holland Company within our county limits was made by Major Adam Hoops, Birdsey Norton, Ebenezer Norton, and Joel Steel, in 1804. Their tract of twenty thousand acres was located on each side of the Allegany river and Olean creek, and mostly in the first township of the 4th and 5th ranges. They commenced a settlement the same year, and soon after laid out the village of Hamilton, (better known as Olean Point,) which was considered the head of navigation on the Allegany; and I think it is the highest point to which any steamboat has ascended above tide-water, being 1,470 feet: this was performed by the steamer Allegany, in the spring of 1830.

From the commencement of the settlement at Olean until the completion of the Erie canal in 1825, the Allegany was used by thousands of emigrants on their way to the south western states. They passed down in arks, flat-boats, skiffs and on rafts. I can call to mind one raft that left Olean with 350 persons on board of it, in the spring of 1808. In March, 1808, this county, Chautauque, and Niagara, were taken from Genesee, and erected into separate counties. The west part of Cattaraugus was attached to Niagara, and the east part to Allegany county for judicial purposes. The town of Olean was organized by the same act and embraced the whole county. The first town meeting was held on the Ischua creek, at the house of the late Gen. Joseph McClure, in the spring of 1809. James Green was elected the first supervisor from this county at that town meeting. The first saw mill erected in the county was on Haskell creek, about three miles above Olean, and was built by James Green, in 1805. Henry Conrad built the first grist mill, on the Ischua creek, about the same time; this was situated two miles below the present village of Franklinville.

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The town of Ischua was organized in 1812, (since changed to Franklinville,) Perrysburg in 1814, Great Valley and Little Valley in 1818, Ellicottville, Freedom, Hindsdale, and Yorkshire in 1820. The county was fully organized in the year 1817, and the first county Courts were held at Hamilton, (now Olean,) in July of that year. Timothy H. Porter was the first judge; James Brooks, Ashbel Freeman, Francis Green and William Price, were associate judges. Israel Curtis was the first sheriff; Sands Bouton, county clerk; Henry Wooster, surrogate; Sylvenus Russell, county treasurer. But two of the first commission on the bench remain with us, and they having fully com plied with the command given to Noah and his sons, and bid fair to remain for long years to bless their posterity and reap the reward of well spent lives. The first courts were held in Ellicottville, in July, 1818, at the house of Baker Leonard; that house and the Company's Land Office were all the dwellings then erected in that place. A court house and jail in onebuilding was built soon after; this was burnt down in the winter of 1829, and the present cout house and jail were built the same year.

Settlements were commenced on the Cattaraugus creek, and on the waters of the Conewango, as early as 1810, but no general settlement of the county by a farming population can be placed anterior to 1817; and singular as it may seem to the younger portion of this audience the fact is nevertheless true, that lands were held higher in this county up to 1820, than they were in Niagara or Chautauque, and your county records show that village lots in Hamilton, (*now Olean,*) sold at a higher price until 1822, than they were bringing in Buffalo.

The Allegany river was then used as the great commercial highway to the valley of the Ohio and Mississippi, and was deemed of more importance than lake navigation. The completion of the Erie canal changed the whole order of things, the tide of emigration changed to the upper lakes, and Cattaraugus was almost forgotten by the hardy pioneer. The splendid white pine on the Allegany and its tributaries had attracted the attention of men fully equal to the task, and every portion of the county gave promise to all who would obey the Divine command. The sound of the woodman's axe rung along the vallies and the sides of our hills became dotted with the dwellings of civilization. The war path of the red men gave place to the more comfortable highway. The howl of the wolf to the bleating of our flocks.

The scenes of the present day are of a different character in Cattaraugus from those of 1818, when I became a resident of the county; and when reviewing the numerous difficulties which have been over-

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come, and the present condition of things, I see no cause to regret for the past, and much to hope for the future.

The completion of the Erie canal, more fully developed the resources of western New-York, and the prominent men of that day who had given that splendid work their most hearty support, never lost sight of the importance of its connection with the Allegany river. From them, emanated the project of the Genesee Valley canal. And it had an important influence with the first movers of the New-York and Erie railroad. When these two works shall have been completed, our county may with truth be ranked among the best in the State for grazing purposes. This may seem a bold assertion, unsupported by facts; but when you contemplate her secluded situation, and the rapid progress already made under her local disadvantages, what will be her condition in a few years after the completion of the New-York and Erie railroad, and the Genesee Valley canal, and in an agricultural point of view? As an evidence of her capacity to produce cattle, sheep, butter, cheese, &c., permit me to make some extracts from the census of 1845.

Our population in 1830, was 15,726; in 1845, it was 30,169; in the year 1844, the county produced 177,000 bushels of wheat, 13,000 of barley, 96,000 of corn, 459,000 of oats, (omitting fractions.) It contained in 1845, 45,256 neat cattle, one-third of which were cows; from which 1,284,535 lbs of butter, and 567,807 lbs. of cheese were made. We also had at that time, 6,908 horses, 102,780 sheep, 30 churches, 220 common schools, 24 grist mills, 144 saw mills, 67 clergymen; besides lawyers, doctors, merchants and land officers to our hearts' content. That our next census will show a large increase in our population and products, no one at all acquainted with the county will doubt.

The difficulties attending the first settlement of a heavy timbered region to a great extent have passed. We are now in a position to improve and better our condition as farmers, and to give an impetus, energy and activity to the various improvements connected with Agriculture. I would not be understood as recommending what is often termed book farming in its fullest extent, but allow me to say, that a prejudice exists, which cannot too soon be removed against improved farming implements, improved breeds of animals, new modes of culture, and more especially against all books and periodicals on these interesting and valuable subjects.

An act to improve the Agriculture of this State was passed in 1819, and the sum of $10,000 per year, for two years, was appropriated and divided among the several counties which should comply with its conditions, and a State Board of Agriculture was formed in January, 1820.

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Stephen Van Rensselaer was the first President, and Solomon Southwick Secretary. They published three volumes of memoirs, and awakened a spirit of inquiry, which resulted in the organization of the present State Society. The New-York State Agricultural Society was reorganized under an act passed in May, 1841, and several acts have since been passed to enable it to carry out the objects of its creation. This Society is doing much good to this all-important interest. Through its aid the numerous improvements in the science, theory and practice of Agriculture, are collected and disseminated among our citizens; their annual State fairs and yearly reports are exerting a healthy influence, and should be sustained.

The American Institute in the city of New-York should not be forgotten. Its annual Fairs which have been continued for more than twenty years are a prominent theatre for the display of American ingenuity; their published reports are a valuable acquisition to any library; all aiding to elevate our national character at home and abroad.

This county in common with most others in the State organized a county Agricultural Society in 1841, and the Hon. Peter Penbroeck was the first President. This society like most improvements has had its share of difficulties to encounter, but they have been met and overcome in a spirit which will not be conquered. The display and attendance during the present Fair, give undoubted evidence of its valuable services, and should urge the officers and members to still greater exertions. The duties committed to you, are of a high character, for it is through the agency of the county societies, that we are to look for knowledge of the various and important improvements being brought home to our agricultural population. Your annual county fairs have done much in this way, and their continuance will prove their usefulness.

Allow me to call your attention to the importance and value of the various agricultural papers and periodicals. Many of these can be obtained at fifty cents or one dollar per year. These would give you a monthly catalogue of the improvements, which are continually being made in farming husbandry. No farmer who desires to prosper in his business can afford to be without one or more of them. Our School District Libraries from their location can be made of great value to the farmer. The influence of this society will soon procure men qualified to make proper selections, and these libraries in a few years will contain all the valuable publications in relation to cattle, horses, sheep and swine; their mode of management; the diseases to which they are liable; the remedies adapted to their cure; the best mode of cultivating our various crops; and their preparation for market.

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These books would then be within the reach of all, and it strikes me that it is a very practical way of sowing knowledge, as it were, broadcast over the county; that a rich harvest would be the result, no one can doubt, who believes that "knowledge is power." The formation of farmers' clubs has been tried in many of our towns, throughout the State, and are highly commended by all those who have seen their benefits. Town fairs at stated periods, say spring and fall, would prove of great advantage as regular market days, and the information obtained on such occasions would fully repay the outlay of time in attending them. The cattle raised in Cattaraugus already take a high rank in the eastern markets, and are sought for with a zeal which gives substantial evidence of their value. Let us continue to improve, as we have done for a few years past, and our stock will rank with any in the state. The greater portion of this county is well adapted to grazing purposes, our soil, climate and elevation, secures us against the severe droughts, which so often destroy the pastures of the more central parts of the state. And the fact that the average time of foddering is less here than in the majority of the counties in the state, is a strong inducement to enlarge as well as improve in this branch of husbandry. The same organic laws of consanguinity govern the whole animal creation, and should never be neglected by any who are desirous to improve their stock. The expense of raising a superior horse is no more than one of our common breeds. And this fact holds true, through the whole catalogue of domestic animals. The difference in the market value fully repays for all the trouble and expense of procuring valuable crosses of the different breeds, besides the gratification of a laudable State, county, and individual pride to excel.

This county is peculiarly well adapted to the raising of sheep; our hills affording them the richest and most reliable pasturage during the season, and our winters are mild in comparison with a large portion of the State, where wool growing is considered a lucrative business. Some more attention is required to improve our flocks, and in the manner of preparing the wool for market. In this branch of husbandry there is nothing to prevent our taking a high rank, but want of attention on the part of farmers.

The dairies of our county have proved eminently successful, and the exports of butter and cheese have become a large item. They are holding a respectable rank in the market: the county can well sustain a very large increase, and every inducement to those engaged in it

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to enlarge and improve is offered in the enhanced price and ready sale of their products. The grazing farmer has a decided advantage over those who are engaged in the growing of grain crops—the soil on grazing farms receives a proper return for the crop taken from it with very little expense to the cultivator—and at least sustains itself—and more generally increases in its products. This is not the case on grain farms; they can only be kept up by a proper rotation of crops and the addition of manures more or less expensive.

Although the largest portion of the county is better adapted to grazing than the growing of grain, the latter should not be neglected, and the supply of animal and vegetable manures, always at the control of the grazing farmer, will enable him to ensure a plentiful supply of grain for his own use: and those portions of the county which are better adapted to the raising of wheat, can with proper attention furnish a sufficient supply to prevent so large an import of flour from other sections of the State. Spring wheat has proved to be a profitable crop in almost all parts of the county, and my own experience has satisfied me that winter wheat can be cultivated with profit on our pine lands in the vicinity of the Allegany. I have raised it to some extent for twenty years past, and seldom failed of a fair crop when the ground was properly prepared, and the wheat sown as early as the first of September. I have this year raised about thirty acres of winter wheat, a sample of which has been exhibited here, and I have the opinion of wheat farmers that it would be called a fair article in any market. In one field of six acres—clear of stumps, the soil a sandy loam underlaid with gravel, with a rolling surface—the original timber was white pine and oak. Two acres of it are occupied by a young apple orchard; the land was well manured from the barn yard in the spring of 1846; sowed to oats, and seeded with red clover, mowed twice in the summer of 1847. In June, 1848, it was plowed under, ten inches deep, was cross plowed twice, and harrowed between each plowing. Twelve bushels of Hutchinson wheat, rolled in plaster, was sowed upon it the last week in August; fifteen bushels of lime was sown broad-cast on it, soon after it was harrowed in. This wheat was harvested between the 15th and 25th of July last; thrashed a few days since, showing a yield of 27 bushels to the acre, weighing 60 lbs. The remaining 24 acres, which had not been cleared of the pine stumps, was sowed about the same time with 1½ bushels to the acre of the same kind of wheat, and produced 25 bushels to the acre.

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I have in previous years raised wheat equal to this, and it is mentioned at this time to induce others to try it.

There is one marked feature of our national character, which is often displayed in our county. I allude to the great desire of change. The often futile hope of bettering their condition by some lucky turn in the wheel of fortune, has induced many a farmer who was doing well, to abandon all, and seek a new home upon the rich prairies of the west. A large proportion of this class would be very glad if they could return to their old localities, and exchange the ague and chill fevers imbibed in their land of promise for the bracing air and pure water of Cattaraugus.

There is to some extent a want of taste in the construction of our farm houses and the outbuildings connected with them. All persons, in traveling through any country, form their opinion of its inhabitants by the appearance of their dwellings. A neat and well ordered dwelling exercises a moral no less than physical influence over its inmates, and is seldom found in the abode of ignorance, vice, or intemperance. One great advantage attending the judicious construction and location of buildings on a farm, is in fixing the value of the homestead in the minds of the family, thereby rendering the hearthstone more sacred.

The amount of capital invested in agricultural pursuits, is always safer than in mercantile operations; commercial revulsions, the hazards of floods and of fires, often destroy the earnings of a life spent in the latter pursuit. The success of a very few of this class of men, is not a proper criterion by which we are enabled to form a correct judgment. They are only the exceptions to the general rule. Of the numbers who have commenced in mercantile business, it has been estimated that ninety-five in every one hundred have failed.

The professions offer but little better encouragement. The mechanical branches are not so much overstocked, and proffer more inducements to such as prefer leaving the safer pursuits of Agriculture. And when we inquire of a healthy, robust man, sixty-five years of age, what his calling has been, nineteen out of every twenty will inform us that they are farmers. Many other reasons offer themselves to my mind in favor of agricultural pursuits, but I forbear wearying your patience with this self-evident truth.

And in conclusion allow me to impress upon every young man, that the pursuits of the farmer are not incompatible with the character of a gentleman. He is in a position which enables him to feel a degree of independence which few, if any, professional or commercial men can arrive at,

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and an education is as important to him as to the professional man, and no substantial reason can be given why it is not. It may not be important for you to be able to conjugate the verbs, and trace out the roots of the dead languages, but it is important for you to know the chemical analysis of the different soils, which are daily under your feet, and ascertain their adaptation to the various kinds of crops. Do all in your power to sustain your county society: its influence is humanizing and exalting. Instead of wishing things better, go to work and make them so. Instead of spending your time in vain regrets for some advantages in our neighboring counties, strive to equal and to excel them; and not five years will have passed until *cold frosty* Cattaraugus will take a rank among other counties of the State, to which her natural resources and wealth justly entitle her.

CAYUGA.

The annual fair of the Cayuga county Agricultural Society for 1849, took place at Auburn on the 10th and 11th of October.

The show presented a rare exhibition of choice stock and the display of cattle far surpassed any similar exhibition of former years. The weather was unpropitious, but the large assemblage of the farmers and yeomen of Cayuga in attendance, gave proof of the growing interest which was felt in regard to the objects of the society. Over five acres of ground were surveyed and enclosed at an expense of about one hundred and twenty dollars; the society having by vote at a previous meeting resolved to enclose the ground and to make the terms of admission the same as of the State Society. The amount raised on membership tickets was over one hundred and forty dollars, and upon shilling tickets over one hundred and seventy dollars. These amounts were collected on the first day of the exhibition and before two o'clock in the afternoon, after which hour the attendance of visitors was entirely cut off by the severe rain. Had it not been for the inclemency of the weather, which made it impossible to accomplish anything on the second day, the receipts of the society would doubtless have been nearly or quite twice the above amount.

The annual plowing match was held in the spring, on the 31st of May, when, as at the fall fair, many were prevented from attending by the bad weather. There was, however, a large body of the citizens of the county present, and an excitement among competitors which far surpassed anything which has marked any former display of the kind.

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The president of the society was among the number that entered the lists, personally challenging the county to try a hand with him at the plow, and notwithstanding he was worsted in the contest, he is ready when opportunity shall present, again to try his hand with the hard-working men of Cayuga.

The expenses of the society for the past year, on account of the enclosing of the ground, have been more than usually large, but the accruing receipts in consequence thereof, have more than covered the extra expenses. The general display was far superior at our last fair to any former one, and gives encouragement of still greater improvement for the future. The entire amount of premiums awarded at the Spring and October fairs were about three hundred dollars, besides the Transactions. The number of cattle upon the ground was about four hundred; the number of horses over one hundred, and a large number of swine, sheep, poultry and household productions. There was also a good display of butter, cheese, fruits, roots and almost every class of agricultural products raised in the State. The display of household manufactures and implements of mechanical skill was extremely good.

The society on the first day of the October fair listened to a most interesting and appropriate address from Ezra W. Bateman, Esq. The entire exhibition was one which we venture to say will compare favorably with any county exhibition in the State.

At the annual meeting held 11th January a preminm was awarded to W. D. Osborn, Port Byron, on carrots, 520 bushels on an half acre. The report of the president and treasurer presented balance in the treasury, $30.00. A resolution was adopted to enclose five acres for a permanent show ground, and a committee appointed to ascertain the cost and report a plan for grounds and buildings to a subsequent meeting.

Officers for 1850.—William Howard, Owasco, President; T. M. Pomeroy, Auburn, Recording Secretary; J. B. Dill, Auburn, Corresponding Secretary; C. A. Parsons, Auburn, Treasurer. A vice president and two members of the executive committee appointed for each town in the county.

CHESTER GRIDLEY, *President.*

Products of Cayuga county shipped east by railroad, since the first of November, from J. B. Dill, Secretary.

5,774 dressed hogs, weighing 1,370,231 lbs., at $4.50 per cwt., $61,660.39. This is an increase of dressed hogs over last year of 1,376,

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the whole weighing about 115 tons. Fat cattle, 200 head, 282,500 lbs., and 150 head still to go to market. 1,019 head of live hogs, 677 live sheep, 72,100 lbs. of butter, 13,999 lbs. cheese, wool sent east, 272,957 lbs., besides the consumption in the woolen manufactories here, which will amount to nearly as much more. The amount paid to the farmers for their various products is not far probably from $100,000. This augurs well for the prosperity of the farmers of Cayuga, and shows the great advantages they derive from a railroad communication at all seasons with the eastern markets.

CHAUTAUQUE.

The annual Fair and Cattle Show of the Chautauque County Agricultural Society for 1849, was held at the village of Sinclearville on the 19th and 20th days of September. The weather during the two days was delightful, and the concourse of people much greater than on any former occasion. A temporary building was erected for the exhibition of domestic manufactures and miscellaneous articles. This department was highly creditable in the number and quality of the articles presented; and not the least attractive feature in it, was the numerous specimens of the handiwork of the ladies, evincing industry, taste and skill in an eminent degree. The plan of the previous year, of requiring an admission fee to the exhibition room of 12½ cents, from all persons who were not members, was adhered to, with results equally as beneficial as the experiment of last year. The receipts from that source, added materially to the funds, and places the finances of the society in a very flourishing condition.

The society has heretofore experienced much inconvenience from the want of a suitable place for the exhibition of this very interesting portion of the productions of our county, as none of the villages in which the Annual Fair has been held, have rooms sufficiently large to accommodate the crowds of people who are anxious for admission. The society have taken incipient measures for obviating this difficulty by appointing a committee to inquire into the expediency of procuring a suitable canvass tent for their use; and have authorized their executive committee to procure one if it should be deemed proper, in season for the exhibition at the next fair. The expenses of temporary structures for that purpose will thereby be avoided, and the people better accommodated than hitherto. The entries of stock were more numerous than on former occasions, all of which were highly creditable to the farmers of Chautauque; and many were exceedingly fine specimens, and would not suffer by a comparison with the stock of any other county. The in-

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terior and upland portions of the county, are peculiarly adapted to grazing. The raising of stock and dairying form a lucrative business for these sections, and it is believed that no portion of the State yields more compensating returns to these branches of industry.

Within the last few years, there has been a very marked improvement in these sections of the county. Improved methods of culture and persevering industry, for which the inhabitants are noted, have reclaimed and rendered highly productive lands formerly esteemed of comparatively small value; elegant and commodious structures, for the various kinds of farm buildings, and well constructed farm implements and labor saving machinery, have superceded the *log house* for the family, the *lee side* of the hovel or stack of fodder, for the stock, the *bull plow* and its kindred implements; and the thousand substantial evidences of prosperity every where to be seen, show plainly, not only that the soil is congenial to the pursuits of our population, but that their exertions are guided by an intelligence and skill that are producing wealth, with a rapidity hitherto unknown in the agricultural history of the county.

An able and instructive address was delivered on the second day of the Fair, by Orson Stiles, Esq., which was listened to with marked attention by a large and intelligent audience.

The next Annual Fair will be held at Jamestown. The officers elected for the ensuing year are as follows: President, Henry Baker, Jamestown; Secretary, Sidney Jones, Jamestown; Treasurer, Samuel A. Brown, Jamestown, and twenty-two Vice-Presidents.

The society offered cash premiums to the amount of $309.25, besides agricultural publications, and the Transactions of the State Agricultural Society, and of the American Institute. There were cash premiums awarded to the amount of $238.00. Of agricultural publications there were awarded eight volumes of the Cultivator, and twelve of the Genesee Farmer, and six volumes of the Transactions of the State Society and American Institute. There were 135 entries of stock of all kinds, and 128 entries of articles of domestic manufacture.

The receipts of the society during the year have been as follows:

For memberships,.....	$152 00
From the State,.....	143 00
Admission fees to exhibition room,.....	109 81
	$404 81
Surplus of last year,.....	154 13
	$558 94

C. J. ALLEN, *President.*

E. F. WARNER, *Secretary.*

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DRAINING.

The following notice of successful draining in this county is worthy of attention:

To-day opportunity was afforded me of witnessing the benefit derived from *under-draining*, a method too little practiced by our native farmers. The under-drained field to which I allude was owned and worked by farmer Thomas Lascelle of Sheridan, or may be within the limits of Arkwright. Farmer Lascelle is a native of Yorkshire, Eng., and in his emigration to this country, seems not to have lost any of that patient industry and skillful agricultural management so peculiar to the yeomanry of that celebrated farming district; the same may also be said of his elder brothers, Arthur and Henry, as observations of their farms in the town of Pomfret will testify.

In an enclosure of about six acres which, excepting a little short of two acres, had been in cultivation for several years by the predecessor of Mr. Lascelle, there was this excepted strip, that lay wholly neglected, being a wet, boggy piece, producing only a growth of coarse, sour grass, unpalatable even to a starved animal—to this quagmire the plow was faithfully applied, and in due time trenches at the distance of about 20 feet apart were dug to the depth of 18 or 20 inches, into the trenches extending the whole length of the piece, stones were thrown loosely so as to admit a passage for the water; the earth was then filled in to the surface, and the ground prepared for the reception of winter seed wheat, and the yield from this acre and seven-eighths of an acre, which before had been entirely worthless, was a little over 66 bushels of good wheat. Will not others try the experiment on similar grounds?

CHEMUNG.

The exhibition of the Agricultural Society was held on the 17th and 18th of October, and a fair display of stock and articles was on exhibition; but owing to the want of funds, and other causes, there was not that spirit which had characterized some of the previous fairs of the Society.

The officers of the Society are J. G. McDowell, President; Wm. T Post, Recording Secretary; E. Benjamin, Corresponding Secretary.

It is to be hoped that vigorous efforts will be made the present year to revive this Society, which has, in times past, done much for the advancement of the Agricultural interests of the county. It cannot be

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otherwise, we should suppose, from the known intelligence of the enterprising farmers of this county, possessing, as they do, as fine a soil as probably is to be found in the State. The facilities opened to them by the railroad to New-York must contribute largely to the wealth of the farmers, and every improvement which the investigations of others has demonstrated as valuable, should, and we doubt not will, be adopted.

CHENANGO.

The annual meeting of the Society was held on the 1st Tuesday of January, and the officers for the year appointed. They consist of a President, seven Vice Presidents, two Secretaries, a Treasurer and one Manager in each town in the county. The business of the preceding year was closed, and premiums awarded on field crops.

On the 3d of July the officers of the Society met and made out a list of premiums, and appointed committees of judges for the fair, to be held at Oxford on the 25th and 26th days of September. A committee of five gentlemen was appointed to make arrangements for the fair. The duties of this committee are highly important, and much depends on their active exertions in getting up the exhibition.

The friends of Agriculture and the arts were gratified by a numerous attendance at the fair, and the exhibition for premiums was creditable to the county, and evinced an increasing interest in the objects of the Society. A large proportion of our farmers are engaged in the business of making butter and cheese. Our fine pastures and pure water enable our dairymen to manufacture large quantities of excellent butter, which commands good prices in market. It is to be noticed, to the credit of our butter making, that at the last State fair, the first premium on butter in one of the classes, was awarded to a Chenango farmer. The books kept at the canal offices and store houses, enable us to state the quantity of butter and cheese sent to market by the Chenango canal this year. It is as follows:

Butter (after deducting the weight of tubs and firkins), 1,966,929 pounds. Cheese, 1,035,256 pounds. It is estimated that one-tenth of the quantity manufactured finds its way to market by the New-York and Erie Railroad, and routes other than the Chenango canal, which added to the above, makes an aggregate of 2,185,476 pounds of butter, and 1,150,284 pounds of cheese, manufactured in the county this year.

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The articles of domestic manufacture were very numerous, and showed great skill, industry and taste. Additional interest was given to this part of the exhibition by the attendance of a large number of ladies. The committee of arrangements, aided by the town managers, appointed a committee of fifty ladies, five from each of the ten towns nearest to the place of the Fair, to assist the committee on domestic manufactures in awarding premiums on articles appropriately referred to their taste and judgment.

The exhibition of animals was such as to attract much attention. The brevity of this report does not allow us to go into particulars, yet we cannot omit noticing some fat cattle belonging to Mr. Whiteman Willcox, the ages and live weight of which were as follows:

1	three years old steer,	weight,	2,250 lbs.
1	do	do	2,040 "
1	four years old heifer,	do	1,560 "
1	do	do	1,804 "
1	four years old steer,	do	1,896 "
1	do	do	2,102 "

Also a pair of well broke steers, 3 years old, belonging to Mr. Augustus Ross, weighing 3,600 lbs.

The committee on Devon bulls, in their report, state that they are of opinion that a cross of the Devons upon the Durhams and native breeds, will be highly advantageous to the graziers and dairymen of Chenango county.

The committee on working oxen and steers, express their satisfaction with the working oxen and steers, presented to them for inspection, and believe the specimens superior to those of former years. We not only hope, but believe, that the same energy will exist until Chenango will be able to compete with any other portion of the State or Union.

The committee on sheep, state, that the numbers were much less than should have been presented at the Chenango County Fair; some of which were very good specimens of the grades to which they belong, and worthy the county they represent; but the committee cannot omit this opportunity to express their regret that the finest flocks have not been represented. The committee would recommend to those who wish to increase the weight of their fleeces, to examine the flock owned by Mr. Hakes, of Pitcher, it being our opinion that they are a superior quality of sheep to breed from for that purpose.

John Shattuck and Luther Osgood, jr., committee on farms, report that they have had but one application to view farms, and that was by George Juliand, of Green. His farm is situated about half a mile

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west of the village of Green; is elevated about 100 feet above the Chenango river, and contains 400 acres of land, of which 270 acres are under improvement. The soil is a yellowish loam, and is well adapted to grazing; about 80 acres of the farm are in meadow, and this season yielded 200 tons of hay, at the rate of 2½ tons per acre. The rest of the farm is principally in pasture, and is well arranged for that purpose.

The committee take pleasure in saying, that the systematic arrangement of the buildings, lots and fences, the neatness and general appearance of the farm and buildings, the order and arrangement of farming tools, &c., all in their places, and a place for all things, do credit to Mr. Juliand, as a neat, practical farmer. The committee without hesitation, recommend this as a model farm to the farmers of Chenango, especially in fencing, and arrangement of lots. Mr. Juliand informed the committee, he had lived on the farm 15 years, and had re-laid nearly every rod of fence on the farm. There are three miles of stone wall, all staked and double top poled, with chesnut poles, generally halved or split. The rest is rail fence, seven and eight rails high, well staked in every corner. Mr. J. keeps about 100 head of steers, 3 and 4 years old this season, and had kept droves, amounting to 2,500 head. The beautiful steers and oxen on the farm, some of which were exhibited at the fair, showed that they had not suffered for want of feed this season, notwithstanding the severe drought. Mr. Juliand's manner of manuring, is top dressing with long manure, ashes, and plaster. The buildings on the farm, are all in good repair, many of them nearly new. The dwelling house is situated a little back from the road, surrounded with a beautiful grove of shade trees, and within view of the village, making it a most delightful location. The wagon houses, barns and sheds, were all literally filled with the productions of the farm. The first premium is awarded to Mr. Juliand.

JOHN TRACY, *President.*

Abstract of account for the year 1849.

1849. Jan. 2nd.	Balance in hands of treasurer,.....	$136 62
Sept. 20th.	Cash from State Treasurer,.....	122 00
" 25th.	Collected of members,.....	280 77
	1 Vol. Transactions sold,.....	1 00
		$540 39
By amount paid out for premiums and expenses,.....		$423 81
Balance in treasurer's hands, Dec. 19, 1849,.....		$116 58

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CLINTON.

In compliance with the requirements of the law on the subject, I transmit the following abstract of the proceedings of the Clinton Co. Agricultural Society for the year 1849; and I assure you it affords me not a little pleasure as an officer of the society, that I am able this once, to report progress; for it may, I think be safely asserted, that during the past year some progress has been made. For the first year or two, all went on tolerably well, except that the withdrawal of disappointed competitors and the small amount of the premiums which the society was able to offer, were all the time laying the foundation for that state of things which ensued. At length, the society became so reduced in point of numbers, and as a consequence, the burden of raising the amount of funds annually required to entitle the society to the appropriation from the state, fell so heavily on a few, that the question, how can the regular sum be raised, became one of grave import. Various expedients were from year to year adopted. To gratify his eye with seeing, a man will often pay his shilling, when all the arguments in the world could not draw from him the farthing in aid of the best reform association in the land. Based upon this well-known principle of human nature, permanent show grounds become not only one of the best, but in ordinary cases the only reliable means of securing the funds necessary to the successful operation of an agricultural society. It was in view of this fact, that the Clinton county society at its seventh anniversary, finding itself without funds and despairing of success by any other means, resolved on making an attempt to obtain a permanent establishment. The experiment was undertaken, and the result has been completely successful. Whether the final success of the undertaking or the presumption in which it was projected will excite the greater admiration, I know not; but this thing at least is certain, that no other society could possibly have made a similar undertaking under less favorable circumstances. Our society proceeded at once to offer the location of its fairs for a term of five years to the place which should at the earliest date raise voluntary subscriptions and place at its disposal a sum sufficient to erect such enclosure, buildings and other fixtures, as the executive committee should deem necessary. Plattsburg being the county town, had the preference until a certain day, after which competition was to be open to the county. The result was, Keeseville became the successful competitor, her citizens furnishing the requisite subscription and a much larger amount than had been voted necessary.

By the means thus secured, and with a small appropriation from the

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society, and the aid of individual exertion, show grounds have been fitted up of a character, both as regards the extent and variety of accommodation, and the style and finish of the buildings and appurtenances, quite creditable to the county, if not the best in the State. The ground selected is very conveniently located in the immediate vicinity of the village of Keeseville, and contains 7½ acres, lying in the form of a parallelogram, 40 rods long, 30 in breadth; the surface being level, and the soil always dry. It is enclosed by a tight wooden paling nearly eight feet in height; next within the paling is a graded carriage-way, or drive, 20 feet in width; and inside are tieing poles for cattle and horses, and pens for sheep and swine, extending around the lot. The building for the exhibition of manufactured articles, fruits, flowers, vegetables, &c., stands nearly in the center of the grounds, and is 100 feet long by 26 in width. At one corner of the lot, adjoining the highway and contiguous to one of the principal entrances, is a smaller building, designed as the general business office of the society. The front of this building is occupied by a range of counters, opening by folding windows to the highway, for the sale of tickets and the entry of animals and articles intended for the fair; while the rear is used as a general committee room. Both these buildings are got up in the rural Gothic style, which though they are cheaply constructed, gives, not only to the buildings but to the whole concern, an appearance of stability and air of neatness, taste and finish, highly appropriate to such an establishment. Among the fixtures, one worthy of special notice as being something new—or at least by no means common—is an apartment for the exercise of horses, during the examination by the judges. It consists of a circular area, ten rods in diameter, graded, and surrounded by a neat and substantial railing. In the centre of the area stands the general flagstaff, for the grounds. The utility of this arrangement will be readily apprehended. None but the judges and the groom, or driver, being admitted within the railing; and the former occupying a central position, a much better opportunity is afforded to judge with precision of the carriage and action of the animal, than by any ordinary method of examination.

Aside, however, from the mere utility of the thing, these exercises are found to constitute one of the most interesting features of our exhibitions. The entire cost of the enclosure, buildings, and fixtures, including the digging and stoning of two wells, grading, &c., amounted to $918.24, of which the sum of $800.94 was defrayed by voluntary subscriptions, leaving a balance of $117.30, required for the completion of the buildings, which was advanced by the president out of his own

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private funds, and afterwards reimbursed by an appropriation made by the society out of funds received at the gate. In some of the older counties, owing to the greater price of lumber, the cost would have been some hundreds of dollars more.

Our eighth annual fair, which came off at Keeseville, at the new show grounds of the society, on the 18th and 19th days of September, was an occasion that will long be remembered by the farmers of Clinton. The weather was fair, the roads fine; and as it was to be the dedication of the society's new show grounds—a fact which had gained considerable notoriety abroad—these and other circumstances conspired to bring together, on those two days, a vast concourse of people—greater, indeed, than had ever been congregated in the county for any merely civil purpose whatever since the sound of the white man's axe was first heard in the wilds of northern New-York. As to the show itself, it might have been better, had the farmers of the county generally taken as deep an interest in the practical part of getting up the show as in coming to see it. In some departments, particularly the dairy, it was inexcusably lean, while in others it was unusually fine. On the whole, it was certainly the best which the society has yet held; and judging from the spirit and good feeling manifested throughout, and the satisfaction expressed by farmers from all parts of the county with the society's movements, there cannot be a doubt that whoever lives to attend the next annual fair of the society will witness not only a gathering of the farmers, but a collection of the products of the county, such as we have not yet seen. Indeed it may be affirmed that never, since the organization of this society, have its prospects been so flattering as at the present moment. By the erection of show grounds and the permanent location of the society's annual fairs, a new set of influences are now brought into operation, which, if properly cherished, cannot fail to render the society increasingly prosperous. Our annual fairs will every year become more interesting and attractive. The funds of the society being greatly increased, it will be enabled to offer more liberal premiums, and thus to enlist a greater degree of zeal and spirit among the competitors. Such are some of the happy results which are confidently expected from the efforts of the past year.

The adoption of a new and more equitable mode of allowing persons to compete for the society's premiums has, during the past year, added another feature to the system of renovating measures introduced. By the new mode, competition, instead of being limited to members of the society, is thrown open to all the citizens of the county; each competitor, whether a member or not, being required to pay a small admission fee for every animal or article entered—equivalent to some

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certain per cent. on the premium offered. By this arrangement, greater equality in the distribution of the society's funds is secured, and, as a consequence, better satisfaction to all parties is given. Members of the society have certainly no right to complain, since in return for their membership fee, (one dollar,) they receive a full equivalent, in the privilege of free ingress and egress at all the exhibitions of the society, a privilege, which, were they not members, would cost them even more. Besides this, they have a right to a voice in the proceedings of the society, which others have not. I am not aware that this measure has been adopted or brought to notice by any similar institution, nor am I sure that it will at first view, meet the approval of agriculturists elsewhere, as one worthy of adoption. But on trial, it will. It is one of the few *new* things under the sun, which will bear acquaintance. Here it took Mr. Battey, who originated the measure, two years to gain a vote of plurality, in favor of its trial. A single year's experiment, however, has been sufficient to establish beyond a doubt, its practical utility. No measure of the society, has been half so popular as this one is at the present moment, as may be inferred from the fact, that at our late annual meeting, it was unanimously adopted as an established rule for the society's future observance, by inserting a clause to that effect in its constitution, *every member* present, voting in the affirmative. The amount of the fee required the past year, was 20 per cent. on the first premium offered. The constitution provides, that hereafter, the amount of the fee shall be determined each year, by the Executive Committee, and as the society is likely to be pretty well supplied with funds from other sources, the per centage will probably be somewhat reduced.

During the past year, premiums have been awarded to the amount of $285.50. The total amount of receipts, including balance on hand from last year, and the appropriation from the State, is $1,410.35; which after paying off all the premiums and other expenses of the society for the past year, including cost of show buildings, &c., will leave on hand, sufficient to defray the expense of publishing the proceedings of the society, for which measures are now in progress. The following is a list of the officers of the society, for 1850:

President, E. A. Hurlburt, Keeseville; Secretary, Willets Keese, Peru; Treasurer, Jonathan Battey, Keeseville, and ten Vice Presidents.

E. A. HURLBURT, *President.*

Keeseville, Dec. 29th, 1849.

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FIELD CROPS.

John W. Bailey, of Plattsburgh, raised on three quarters of an acre 504 and a half bushels of carrots, Orange variety. Soil mostly sandy; one-third clay. Expense of cultivation, $24.10. Avails of crop, at 20 cents per bushel, $100.90. In favor of crop, $76.80.

Wm. Keese, of Keeseville, one acre of corn; yield, 99 bush., 20 lbs. Expense of cultivation, $24.56. Avails of crop, at 5s per bush., $68.06. 3 loads stalks, $6.50. Pumpkins, $2. Total, $76.56. In favor of crop, $52.00.

Wm. Keese, potatoes, 1 acre, 235 and a half bush. Expense of cultivation, $25.50. Avails, at 2s. 6d. per bush., $73.59. In favor of crop, $46.84. Planted in hills, nearly 3 feet apart each way. A small tea cup of strong ashes put on before the potatoes were up.

COLUMBIA.

The anuual Fair was held at Hudson on the 8th and 9th of October, and was an interesting occasion for the farmers of Columbia. The attendance was much larger than on any former occasion, and the exhibition was well sustained and creditable to the farmers of the county.

The display of cattle and horses was very good, and in each department there were animals of superior excellence. In the ladies department the show was especially rich, and attracted, as it deserved, an immense assemblage. The exhibition of fruits and vegetables was good. The pears, apples, and other fruit, was very fine, and evidences increased attention on the part of the farmers. In the mechanical department the exhibition was extensive, and of a high degree of merit.

The plowing match excited a spirited competition, and the work was extremely well done; the first prize awarded to a lad only seventeen years of age.

The annual address was delivered by James McGiffert Esq., the president of the society. The following valuable suggestions from the address are worthy the attention of all our farmers:

With due deference to the opinion of others, I make free to say, that there is a much greater proportion of farmers and mechanics, who from the same capital and talents procure a competency, than there is from the professional and mercantile classes of society. Take a view through our own county, and you will find, instead of five or six, at least thirty or forty per cent, who have succeeded in procuring a sufficiency of the

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good things of this life, after toiling no more years than the successful merchant or professional gentleman. And who, I would ask, lives more comfortable than the farmer? Who sleeps more soundly? Who eats more wholesome food? Who has the choicest fruits, and in the best and healthiest condition? Who is more independent than the farmer, who, when viewing his fields and flocks can say, "I am monarch of all I survey? Is there a person of common sense, so blinded by the foolish fashions of the world, who would prefer the restrained, unnatural life of the wealthy merchant or professional man, to the plain, easy, and contented life of him who lives retired amidst his flocks and herds, and daily views the the works of nature, adorned and beautified by his own skilful hands? If there be such a person within these walls, I truly pity him, and would, if possible, inspire him with a better mind.

But it may be justly asked, if such be the relative advantages of the farmer, how is it that so many sons of farmers leave the country and crowd the cities of the land? This arises from a want of a proper education, and an ignorance of their own condition. Farmers as a class, have never known their happy lot. They have been satisfied with a very imperfect education, and consequently are ignorant of their proper station in society, and yield to others, more forward to seize upon every thing that may tend to elevate them in the eyes of their more modest, unpretending neighbors. The cultivators of the soil have too long been contented with the mere elements of education, and have looked upon themselves as a class requiring but little knowledge to enable them to obtain everything they need. And if, without a proper education, they have been enabled to do so much, what would be their relative condition were they favored with such a stock of knowledge as they ought to possess?

But how can such an education be obtained by the sons of common, laboring farmers? First, by elevating the common schools, which none have such opportunities of doing as the farmers. We have, through the bounty of the State, a system of common schools, which, with the assistance of the community, might be raised to such a height as to impart as much useful instruction, as at present is attainable in our academies; and our academies would then become as high in the means of imparting knowledge, as our colleges are at present; and then, for those who desire to advance still higher, let there be agricultural schools or colleges throughout the land, as numerous as may be required. You farmers, I say, have only to become acquainted with your own

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power and *will* such a state of things, and none can successfully oppose you. Arouse yourselves therefore, fellow farmers and mechanics, the true bone and sinew of the country, and prove to all of every profession, that you are at least their equals; and that you will henceforth enjoy your rights as men, intelligent, educated men.

Officers 1850.—James McGiffert, President; John P. Beekman, Isaac Foster, Oliver Wiswall, Jacob N. Harder, Vice Presidents; Abraham Pierce, Secretary; Henry C. Miller, Treasurer; and an executive committee of thirteen.

CORTLAND.

Agreeable to the requirements of the statute, I proceed to state, first, that the amounts contributed to Cortland Co. Agricultural Society for the past year was about $95, together with $75 appropriated from the state, and about $43 balance on hand from last year, making in all $213, of which amount $185 has been paid out for premiums; about $30 of this amount was paid for agricultural papers for distribution as premiums. The competitors on root and grain crops, were less this season than usual; the premium awarded on best acre of Ruta-Bagas, to G. H. Chamberlain, about 750 bushels; half acre carrots, 350 bushels. Best acre corn 91 bushels. Best acre wheat, 25¼ bushels. I am happy to say the condition and prospects of usefulness of this society are on the whole very flattering. Show of cattle uncommonly good as to numbers and quality. That of every other department a decided improvement upon any previous Fair. The show of butter and cheese was not only large, but of excellent quality. There is manifestly an increased interest felt on the subject of Agriculture in this county.

The principal productions of this county are butter, cheese, pork, wool, corn and oats, and cattle for beef. The average yield of oats the past year, I put at 30 bushels per acre; of corn at 30 bushels; of hay per acre 1¼ tons. I think the crops average 10 per cent better than in 1845; and are better than in 1847. Of wheat, there is not much sown on account of the wheat fly. There was some of the Mediterranean winter wheat raised the last season, and succeeded very well. This variety of wheat *ripens at least ten days* earlier than the other kinds of winter wheat, and thus escapes the attacks of the fly. Average yield pota-

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toes per acre, 150 bushels. There has been very little rot in potatoes the last year, always less disease in a dry season. When the potatoes are half grown and from that time until they are fully ripe, if we have hot wet weather, I discover we have much rot. My remedy is, to drop 3 table spoonfuls slacked lime on the potatoes in the hill when I plant; in this way have had very little rot, while my neighbors adjoining farms on a soil just like mine, have nearly or wholly lost theirs. Dairies are on the increase in our county. Dairymen improve very much in the manufacture of butter and cheese. We have very many as good butter dairies as are in the State. The average quantity of butter made from a cow, is, I think, 140 lbs.; some dairies make 200 lbs. Our dairy of 21 cows, 218 lbs. this season. The quantity of cheese about 350 lbs. per cow. Of cattle, the natives are most common, and with a slight cross, say ¼ with Durhams, most valuable for the dairy. Durhams or short horns most valuable for beef. Of horses, we have a great variety, mostly too light to be well adapted to all work.

The eleventh annual report forwarded to the state department, shows that we have received and paid out more money than in any previous year; and I think I am warranted in making the assertion, that in the towns that *take most interest* in the society, the *increase in the products of their farms is at least* 25 *per cent*, since the organization of our society. PETER WALRAD, *President.*

DELAWARE.

From the inland situation of our county, and the uneven and rugged features of much of its surface, making it more difficult of cultivation than many other counties of the State, it is natural to infer that Delaware county should be, in Agricultural advances, behind many of her sister counties, which are more highly favored by nature. But notwithstanding this is doubtless true, yet, being inhabited mainly by a virtuous and industrious people, the hardy features of the soil are rapidly yielding to the improvements of the cultivator. He who has known Delaware county *only in years past*, to visit it now, would find the old buildings giving place to more elegant and commodious ones, and the *meager* crops being succeeded by more luxuriant ones.

Butter is the staple article of the county, though wool is grown somewhat extensively by some of our farmers. The large flocks are mostly Saxon; the average weight of fleece is about two and a half pounds.

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Delaware butter is fast coming into note, and many of our dairymen make two hundred pounds of butter from a cow, during the season. The average number of pounds, however, from a cow will not exceed one hundred and fifty. The amount of stock kept makes it necessary that much the largest portion of our land should be kept in grass, for grazing and meadow; though some crops of grain are profitably raised. The average amount of hay per acre it is difficult to estimate. It varies from one to three tons.

Oats are raised in large quantities, averaging about forty-five bushels per acre, though some pieces yield as many as one hundred bushels per acre. Corn for several years has done quite well, affording about fifty bushels from the acre. Potatoes, the present year, have not been diseased, though the crop has been light, in consequence of the drought. No *cause* of the disease or *remedy* for it has been discovered. Wheat has not been raised much for several years; the "weevil" (wheat-midge) having destroyed it. The "Black Sea" spring wheat has been raised by some of our farmers for the last two years with success. Fruit has been much neglected, though much more attention is now being given to its cultivation. Our cattle are mostly natives, though the Durham, Holderness and Devon cattle are raised to some extent. We have the most of the Durhams. Our annual Fair and Cattle-show was held on the 3d of October. It was a day of interest.

The receipts and expenditures of our society the present year are as follows:

Received of members,		$106 00
" State,		106 00
Amount in treasury from last year,		73 54
		$285 54
Paid in premiums,	$272 50	
Incidental expenses,	8 24	
		280 74
Balance in treasury,		$4 80

JOHN TOWNSEND, *Pres't.*

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DUTCHESS.

The Annual Fair of the Dutchess county Agricultural Society was held in the village of Poughkeepsie on the 3d and 4th of October. The display was not all that could be wished, because many farmers who have fine stock or have good yields of grain, did not bring the former or specimens of the latter, from the fear that something better might be exhibited by others; and herein they committed a mistake which detracted from the interest of the fair. The rule of our agricultural friends should be to bring anything they have that is good. When they do it, and the sooner the better, our agricultural shows will receive an impetus which will be seen and felt by all. Still much excellent stock, several superior agricultural implements and some beautiful productions of the mechanical arts were exhibited on the field; while the hall, the chief place of attraction, had a fine collection of rare and beautiful specimens of skill, art and genius, as well as many fine and mammoth productions from the field and garden. There was a constant rush to it during the day and a half it was open. The morning of the second day was rainy, still, as soon as the clouds broke away, arrangements were made for the plowing match, which took place on the grounds of the county house. In the afternoon an address was delivered before the society by the well known and able agricultural writer, Mr. Solon Robinson, of Indiana. His remarks were such as a practical farmer, desirous of the improvement and elevation of the great producing class, would address to his fellow agriculturists.

On the conclusion of the address the premiums were awarded to the successful competitors. The premiums amount to $361 and 82 volumes of works on Agriculture, Horticulture, &c. We noticed at the fair with particular satisfaction a collection of thirty ears of yellow corn, from Alfred B. Underhill. About 18 years ago, this gentleman commenced to cull the largest ears of field corn for seed, and he has pursued the practice to the present time. The result exhibits a remarkable improvement in the grain, the length of ears varying from 12 to 15 inches. The specimens on deposit were gathered from about 20 bushels. No extra cultivation had been given to the crop at any time, and we are informed that the yield is sometimes 70 bushels to the acre. It is pleasing to see that our agriculturists are beginning to appreciate the importance of reserving the best and most perfect portions of their crops for seed.

The following gentlemen were selected as officers of the society for 1850, viz: Cornelius Du Bois, President; Thomas Tabor, Henry

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Mesier, J. F. Sheafe, Aaron Vail, J. W. Wheeler, Calvert Canfield, Vice Presidents; Barclay Haviland, Samuel T. Tabor, Recording Secretaries; S. B. Trowbridge, R. G. Coffin, Abraham Burton, Corresponding Secretaries, and Henry A. Field, Treasurer.

Our next show is to be held near the center of the county at Seymour Tomlinson's, Washington Hollow.

B. HAVILAND, *Secretary.*

ERIE.

The Annual Fair was held at Buffalo on the 3d and 4th of October. The weather cloudy and the prospect of heavy rains prevented many from attending, still the gathering was a very respectable one.

The show of matched and single horses was very good. The show of cattle was fine, better than at our previous fair, especially the grade stock. The Short Horns were few in number; the Devons less; the Herefords well represented. The grade and natives were in goodly numbers and many of them very good. Of working cattle, but few exhibited; a pair of well trained steers attracted considerable attention. Fat cattle were of the best quality, and but few in number. The sheep and swine and poultry were few compared with former fairs. The butter and cheese on exhibition was good; some fine samples of grain and corn exhibited and a fine display of vegetables. The show of fruits and flowers was unusually fine and the competition very close and spirited. The household products made a very respectable appearance, and displayed the industry and taste of the ladies to great advantage. A bed quilt worked by Mrs. Alonzo Rayner, of Clarence, attracted much attention. The plowing match was spirited, though the competition was not large.

The subscription to the funds of the society, as heretofore, were mainly contributed by the citizens of Buffalo, who have ever shown a lively interest in the success of the society, while the great mass of the farmers in the county have manifested a wonderful indifference to all of its transactions since its organization, few comparatively contributing to its funds or affording any aid in getting up the annual exhibitions. It having been suggested by some of the members, that by changing the place of holding the annual fair to some more central town in the county it would have a tendency to enlist a larger number of the farmers in the future proceedings of the society, it was resolved at the last meeting to hold the next annual fair in the village of Aurora.

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Receipts and Expenditures.

Balance on hand 1847,..	$62 06	Paid out in premiums,.	$321 87
Memberships, ...	196 00	Balance in treasury,...	122 19
From State Treasurer,...	186 00		
	$444 06		$444 06

Officers 1850.—President, Robert Pearson, Aurora; Vice Presidents, John W. Hamlin, Aaron Gould, Apollos Hitchcock, Lewis F. Allen, Alonzo Rayner; Treasurer, H. D. Stiles, Aurora; Secretary, Aaron Riley, Aurora, (Willink P. O.)

W. H. SOTHAM, *President.*

ISAAC F. BRYANT, *Secretary.*

Extracts from the Address before the Society, delivered by the President, W. H. Sotham, Esq.

Rotation of crops.—On grain land I would recommend a rotation of crops, a three, five or seven years system; but beware of sowing three white crops in succession; two is one too many. The plow, the foundation and support of good husbandry is an all important implement in agriculture. I advise straight, deep furrows, narrowly turned, the three first steps towards good husbandry. The seed when sown should be thoroughly dragged both ways. This part of the work on the farm is too much neglected.

Draining.—I might class under-draining as one of the most important items for the improvement of farming. I am sure of its efficacy, and would strongly recommend it, for it will ere long rank among the highest branches of our agriculture, and Erie county will ultimately be very much benefited by it. The high price of labor is now a drawback to this decided improvement. The time will soon come when labor will find its level and its real value. The immense number of immigrants will afford facilities for work of this description and thereby render the land more productive, and thus enable us to support them, and their industry receive a proper reward.

Manures.—The saving and applying of manures is another weighty matter with us all. There is more loss from the barn yard than the farmer is usually aware of, and for this reason I should put it on the land from the stables in the winter as fast as it is made Those, however, who disagree with me as to the application of manure in this manner can make a compost heap of it in the field on which it is intended to be used. "All organic substances which have entered into

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a state of putrefaction or decomposition, contain the elements necessary for the reproduction and perfection of the vegetables which we cultivate." If a farmer, therefore, has on his farm a mine of farm yard dung with as much night soil and slaughter house manure as he can collect in the winter, let him turn them all over and well mix them in the spring, he can use it in any place he deems proper, and need not seek any further for fertilizing agents to keep up his soil to the best advantage. All the chemists in the world cannot apply a better remedy. Nothing will pay a man better than this mode of proceeding, for manure is money to the farmer the world over, and if the present high price of labor can be sustained, it is by the free application of manure to enrich your land and increase your crops that it will be done. It is a common practice for farmers to carry their hay to market without returning its equivalent in manure, and as long as this system is pursued the land must become impoverished; even when sold at a high price, he will, by this course, eventually be the looser. If a sufficient number of cattle and sheep or either, best suited to the soil and locality, be kept on the farm to consume the products, it will enable the farmer, by judicious management to enrich his farm, add to his capital, and the result will be advantageous to him in every respect. The more he adds to the capability of his soil, so much the more he adds to his capital, and his *deposits* will be permanent, subject always to any draft he may make.

Farms in Clarence.—I made a short trip a few days since and found some excellent farms in the town of Clarence, and some good farmers. Amongst them were Mr. Rayner, Mr. Ransom, Mr. Warren, Mr. Mills, Mr. Love and others. They had mostly just finished their wheat sowing, and I will say without fear of contradiction, that it could not be put into the ground better; their example is worthy of imitation. There is a very commendable spirit of improvement among these farmers. Mr. Warren generally sows his wheat the latter part of August, and says he invariably has had better wheat on his low land than when sowed later. He uses a five shear cultivator, drawn by two horses, after once plowing, and thinks it answers a better purpose than plowing again. It is decidedly a useful implement and I think will soon come into general use. Mr. Ransom has a new drill and has drilled in a portion of his wheat, which looks very promising. Mr. Mills has done the same with his. I have been familiar with this practice in England, but never have perceived the advantage, unless for the purpose of hoeing, as it is practiced there. The limestone sandy loam in this own is valuable for wheat, clover, barley and oats, for any kind of root

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crops, and I was glad to learn that these gentlemen are all pursuing a rotation of crops with much system and judgment.

Berkshire Hogs.—At Mr. Rayner's I saw a fine lot of Berkshire hogs. My mind dwelt upon the ups and downs this breed had gone through with in this country by tongue, pen, ink and paper. A white spot was wrong in one place, some sandy hairs on the curl of the tail were wanting; a few extra bristles on their backs, and many other equally frivolous objections have been made use of to disparage the breed. The sire of the yard of pigs, with his prime chop, heavy joles, broad, straight back, weighty hams, short legs, fine bone and length of carcase, told the whole story; he is capable of being made to weigh seven hundred pounds. I left the examination of this remarkably fine exhibition of swine with a firm impression long since made and from which I have never wavered, that the best kind of Berkshires *are the best breed of hogs* in the world, make better and more pork, with less consumption and less offal than any other.

ESSEX.

The organization of an Agricultural Society in this county did not take place until March, 1849. This delay may be imputed particularly to the unfavorable physical features of the county—embracing an area of nearly 1800 square miles in its surface, traversed and dismembered by lofty ranges of mountains, it possesses no commanding central position conveniently accessible to the extremities. Its remote sections have little of the associations of habitual intercourse or business relations.

The Clinton county society last winter, adopted a change in its arrangements, by which its annual Fairs were located at Keeseville for the period of five years. That village is situated on both banks of the river Ausable, the boundary line between the counties of Essex and Clinton. This event suggested a place for a union of the efforts of the citizens of the two counties, which it was thought must place their societies in a position of more than ordinary usefulness. A union of the two societies at their annual festival last autumn was arranged, with the purpose, if its effect seemed favorable and the place should meet the general approbation of the patrons of both societies, of adopting it as a permanent arrangement. It was decided to hold the fairs simultaneously and at the same place, but separate in their proceedings and

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distinct in their organization. In accordance with this arrangement a convenient situation was selected, contiguous to the village, and a suitable enclosure with appropriate edifices, the whole embracing an area of about eight acres, was erected, by the public spirit and enlightened enterprise of the citizens of Keeseville and its immediate vicinity. The expense of these erections exceeded one thousand dollars. One section of the ground and of the hall was occupied by the exhibitions of Essex county, the rest was devoted to those of Clinton. Here was held the first Fair of the Essex county Agricultural Society, and notwithstanding many adverse circumstances, its results were eminently gratifying to its friends, and indicative of great future usefulness. The occasion attracted a numerous attendance, and diffused throughout the county a strong interest in the subject.

The obstacles and embarrassments generally incident to the incipient steps of such an effort, unavoidably delayed the enunciation of the premiums offered until only a short period previous to the fair. This circumstance precluded any unusual effort in the preparation of either crops or animals for competition. Hence we had exhibited only the natural and ordinary productions of our farms. Yet this exhibition, under circumstances peculiarly unfavorable, [a severe drought through the fore part of the summer having greatly injured the early crops,] was highly creditable, and indicated considerable progress in many important departments of agricultural pursuits. We were brought into direct contrast, and in some respect conflict, with our elder sister of Clinton, and whilst on that occasion we yielded to her the palm on most branches, the farmers of Essex will not shrink from future competition. The display of horses, particularly several of the Black Hawk family, has rarely been equalled, perhaps never in this State excelled. The specimens of mechanical skill and ingenuity exhibited were very superior and beautiful both in style and fabric. The competition in dairy products was very respectable, and manifested a growing attention to that important source of farming profit. Some fine cattle were also exhibited. We hope to be able to announce hereafter more animated competition and more extended exhibitions in the various branches of domestic manufactures, than were allowed by the circumstances of the last year.

The county of Essex has been widely distinguished for its immense mineral resources. The inexhaustible wealth contained within its mountains, the developement of which has hardly yet commenced, is not alone the element of its prosperity and progress. In many entire sections of the county, the soil is of great native fertility, and through-

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out its whole territory there occurs, in the valleys and along the courses of its rivers and lakes, tracts rich and productive, well cultivated and capable of the highest improvement. The hills and many of the mountains of the county are adapted to the different species of grazing, and we are assured that more than usual attention is being directed to this important branch of agriculture.

When it is considered, that in the whole manufacturing region of northern New-York, the consumers immensely exceed the producers, and that the latter class enjoy at their own doors a certain and ready demand, at the highest prices of southern markets, for almost every agricultural commodity, none can fail to recognize the favorable position of the farmers of Essex county. Our cultivators have been too much diverted from their appropriate pursuits by the delusive attractions of the lumber and manufacturing business. There is however a decided and most gratifying revolution taking place in this particular in the habits of our community. The agricultural interests of the county are becoming better understood, and are rapidly attaining their desired prominence. To the mass of our farmers, the culture of the farm has become the first and important object. Guided by science, and embracing the practical and judicious improvements of modern agriculture, the farmer of Essex will hold a commanding and prosperous position. It is confidently expected that this society will prove an efficient auxiliary in promoting, by systematic effort, the advancement of the farming interests of the county.

The union of the fairs of the two societies was a mere experiment, but we regard it as admirably calculated to advance all the designs contemplated in these associations. Two-fold results will be accomplished by this combined effort—individual competition will be maintained with all its beneficial influence and a vigorous and animated emulation will be aroused between the two counties. A great augmentation in the numbers assembled will be secured, a great and certain increase in the exhibition of every department will be attained. These advantages will attach to a combined fair unusual interest and attractions.

By the report of the Treasurer, which has been made to the Comptroller's office, it appears that the receipts of the society during the past year have been as follows, viz:

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From membership fees,.....		$123 00
Sale of tickets at fair, two days, ...		65 84
Sale of books,.....		6 75
State Treasurer,.....		71 00
		$266 79
There has been paid out in premiums,.....	$110 25	
" " incidental expenses,..	79 29	
		189 54
Leaving a balance of.....		$77 25

Our annual meeting meeting was held on the 8th of January, 1850, when the following officers for the ensuing year were elected, viz: President, Winslow C. Watson, of Chesterfield; nineteen Vice-Presidents; Secretary, John F. Morgan, Keeseville; Treasurer, Norman Page, Chesterfield.

J. N. MACOMBER, *President.*

FULTON AND HAMILTON.

The Fulton and Hamilton County Agricultural Society held their annual Fair in the village of Johnstown, on the 3d of October. The morning was very unpropitious, in consequence of a fall of rain, which continued until the hour designated for meeting, which prevented, in a great measure, competitors from a distance participating in the afterwards brilliant display of the day.

The friends of Agriculture began to pour in from all directions, especially from contiguous towns, until the streets and show grounds were literally covered with thousands of anxious spectators and competitors, who evinced the feeling and zeal they have in the improvement and promotion of Agriculture and the arts. The day has gone past, that farmers of Fulton say "I do this way because my fathers did so;" but generally every farmer reasons for himself, and begins to trace out cause and effect, scrutinizes with care the particular soil that is best adapted to a certain species of grain. The works on Agriculture which have been diffused through our county in the shape of premiums, for the past few years, have had a tendency to awake and excite the lethargic farmer, and lead him to adopt that system which has proved successful. The annual address was delivered by Stephen

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Sammons, Esq., of Mohawk. It was a masterly production, and replete with information of a statistical kind. The court-house, where we exhibited the production of the loom and needle, was insufficient to contain so great a variety of useful and ornamental work as was that day exhibited, which was the best manifestation of the ingenuity and industry of the fair daughters of Fulton. The mechanical department was rather sparsely represented, but the specimens offered for exhibition reflect much credit on the skill of the manufacturers. From the furnace of Clearland, Northrup & Co., were shown beautiful specimens of stoves and castings, especially a stove called the California, by them patented. The exhibition of stock was decidedly of a superior quality. Great pains have been taken by the farmers of Fulton to improve their stock, and they are just beginning to realize the fruit of their labors.

The county of Fulton may be called a grazing county; from it large large quantities of butter, cheese, and pork, are exported annually. The butter made in this county has become proverbial for its superior quality, (in eastern markets) and commands a ready and high price, it is eagerly sought after for shipping, by those who have tested its virtue. We had one hundred and ninety animals and articles entered, by ninety-eight individuals.

The following is a report of the finances of the society, by A. Anderson, treasurer, for the year 1849:

To amount premiums awarded and paid,.....	$130	75
Incidental expenses, binding Trans., printing, &c.	55	94
By balance in treasury from last year,.....	25	30
Amount received for memberships, Entries at Fair and subscriptions, ...	125	51
Amount received from State Treasury,.....	80	00
Leaving a balance in the treasury of.....	$24	21

The following are the officers chosen for the ensuing year, viz: For President, Daniel Lafetz, of Ephratah; Vice President, James Edwards, of Ephratah; Secretary, William J. Robb, of Perth; Treasurer, Archibald Anderson, of Johnstown; and an executive committee of fourteen.

WILLIAM J. ROBB, *Secretary.*

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GENESEE.

The undersigned would report, that the Genesee County Agricultural Society held its tenth Annual agricultural Show and Fair at Batavia, on the 4th and 5th days of October. The days were unfavorable; notwithstanding which, as in former years, the citizens of the county crowded in great numbers to this their annual jubilee, to the number of five or six thousand, and every accommodation for man or beast, was filled literally to overflowing.

At an early hour the exhibition grounds began to fill with the fine improved stock of the county, in such herds as to astonish all; consisting of cattle of aristocratic blood and the independent native, with sheep of the finest, middling, and coarser grades; and horses of beautiful and majestic bearing, in the veins of which coursed the blood of their Arabian, English, and French sires, justly distinguished for speed, power of endurance and strength. Three hundred and seventy-nine animals were entered for premiums; 125 horses, 179 cattle, 68 sheep, 7 swine. The large room at the Eagle was first used for the exhibition of domestic manufactures, but soon became so filled that the committee, under whose charge and superintendence it was, found themselves obliged to remove a part of the articles to the court-house; and, as at the Eagle, so there it rapidly filled with all sorts of useful and ornamental articles, doing much credit to the ladies of the county.

Upon grain and root crops the competition has not yet been large, which we much regret, as our soil is so prolific, that we believe "Old Genesee" has it in her power to compete with any other county in the State, in this particular; and we believe that at our next exhibition we shall be able to give a better account of our products. The competition for the premiums on farms, has as yet been exceedingly limited, but we believe will have, as it deserves, hereafter, more attention, as farmers are rapidly relieving themselves from a heavy debt, which has, like an incubus, borne heavily upon them, since the settlement of the Holland Purchase; and as they extricate themselves they expend more liberally in improvements, and we confidently believe that the time is fast approaching when our county will be literally "the garden of the Empire State," and as distinguished for its cultivation and beauty, as it now is for its products. The annual address was delivered by the Secretary of the State Society, to a large audience.

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The amount of produce sold in our market town (Batavia) alone, for the last year, is: wheat, 150,000 bushels; pork, 485 tons; wool, 156,000 lbs.; butter, 50 tons; besides large quantities in other parts of the county; all of which has been exported therefrom. But still plenty crowns our labors, and many a storehouse is literally groaning under the weight of abundance, and we have "enough and to spare."

At the annual meeting on the 8th inst., the following officers were elected for the ensuing year: Samuel Heston, President; Edw. Foster, F. P. Pendill, J. W. Duguid, and B. Benedict, Vice Presidents; G. B. Worthington, Treasurer; A. Cowden, Secretary.

The receipts for 1849 are,.....	$303 42
Received from State,.....	92 00
	$395 42
Paid out for premiums, &c., ...	243 14
Balance on hand,.....	$152 28

S. HESTON, *President*,

Batavia, January 15, 1850.

GREENE.

The eighth Annual Cattle Show and Fair of the Greene Co. Agricultural Society, was held at East Durham on the 9th and 10th days of October, 1849. The first day was devoted wholly to the exhibition and examination of animals and articles offered for premiums. The assemblage of the friends of Agriculture, from all parts of the county, was unusually large, and gave evidence of a deep and abiding interest felt, and the importance of sustaining the society. The show of cattle and stock, of various descriptions, far exceeded those of any of the previous years, except horses, the number being very small, and gave proof that something is wanting to excite emulation in this important branch of universal interest. There was a very fine exhibition of the products of the dairy, and evinced a determination on the part of our farmers, not to be outdone in quality, if in quantity. Many were the competitors for premiums on fine specimens of fruit and vegetables. Beautiful specimens of agricultural implements and mechanical articles were exhibited, and received at the hands of the proper committees the award of premiums, for the wonderful skill and ingenuity of the mechanic. The ladies, as usual, were present, and exhibited beautiful specimens of

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their own handiwork, and gave assurance that nothing is wanting on their part to make this society compare with any in the State. The annual address was delivered by William F. Terhune, Esq., of Coxsackie.

Premiums to the amount of $185.25, were awarded and paid by the society, besides diplomas, books, &c. Officers of the society for the year 1850: George Robertson, President; five Vice Presidents; Almeron Marks, Recording Secretary, Durham; J. B Hinman, Corresponding Secretary, Jewett.

AUGUSTUS HILL, *Rec. Secretary.*

Cairo, January 1st, 1850.

HERKIMER.

The Herkimer county Agricultural Society held the Annual Fair at the village of Mohawk on the 18th day of September, 1849. Early in the month of June previous, the executive officers held a meeting for the purpose of preparing a premium list and to make arrangements for the approaching Fair. The sum of $260 was offered by the society in prizes under the heads of classified articles, and a committee appointed on unspecified articles, embracing a wide range in useful and ornamental productions. It was thought advisable by the officers of the Society to hold the fair but one day, heretofore two days have been devoted to that purpose. A lively interest was manifested for the prosperity of the society, and it was determined to get up a grand jubilee and to surpass all other fairs heretofore held in our county.

The 18th was one of those fine autumnal days, the finest of the season, and early in the morning people began to come in from all directions, bringing with them whatever of excellence in agricultural productions, household manufactures, mechanical skill and ornamental work, their several vocations, taste or inclinations had induced them to exhibit. The number of persons in attendance far surpassed that of any previous fair held in our county, and the exhibition of stock and most other articles excelled previous exhibitions.

A spirited plowing match, six competitors, came off at 3 o'clock P. M., after which the members of the society and spectators repaired to the spacious Dutch church, where had already assembled a large concourse of ladies to listen to the exercises there. After an appropriate prayer, the president of the society delivered an address, in all respects worthy of the occasion, replete with sound and practical observation,

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which was listened to with marked attention. The several viewing committees then read their reports. An excellent choir of singers from the town of Litchfield were in attendance, and entertained the audience with select and appropriate pieces, which added much to the pleasures of the day.

The village of Herkimer was fixed upon by a vote of the society as the place for holding the next Annual Fair, and officers for 1850 elected, to wit: Ezra Graves, of Herkimer, President; A. L. Fish, of Litchfield, Vice President; Henry A. Clark, of Herkimer, Secretary; Robert Earl, of Herkimer, Treasurer; Anson Rider, of Litchfield, Samuel Green, of Fairfield, and Z. B. Wakeman, of Herkimer, Executive committee.

Paid premiums as per vouchers,.....	$189 31	
R. Earl, bill printing,.....	20 00	
R. P. Green, fitting show ground,.....	16 50	
Other expenses,.....	13 94	
		$239 75
Received voluntary subscriptions,.....	$116 50	
Transactions sold,.....	5 90	
State appropriation, (to be received,).....	112 00	
		234 40
Balance due Treasury,.....		$5 35
Premiums unpaid,.....		8 50
Deficit in Treasury for this year,.....		$13 85

J. N. WIGHTMAN, *Treasurer*,

Dated December 31st, 1849.

REPORT OF THE COMMITTEE ON DAIRIES—THOMAS BURCH, CHAIRMAN.

The committee on dairies respectfully report, that but two samples of butter were offered for premium. The committee awarded for best sample of butter a premium of $4 to Mrs. M. F. Spinner, of Herkimer; second premium of $3 to A. Farmer, of Mohawk.

There was a better display of cheese, the fine flavor and good quality of which does credit to even Herkimer county, the fame of whose dairies has long since gone abroad. The committee award on cheese for the best sample, $6, to Benj. Hurd, of Norway; second do., $5, to Roswell A. Rider, of Litchfield; third do., $4, to Chauncey Adams, of Columbia; fourth do., $3, to Jacob Ellison, of Newport; fifth do., vol. Transactions to A. Farmer, of Mohawk.

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Mr. Anson Rider was the only applicant for the premium of $5 offered "to the person who should show the most profitable product of a dairy of cows not less than ten, for a period of not less than one month, the keeping and labor considered." Mr. Rider's statement shows a product for one month from thirty cows, with extra feed, of 2,430 lbs; this product of but little over 2½ lbs. a day for each cow, being no more than an ordinary yield, and there being no competition, the committee did not feel at liberty to award the premium of $5, but recommend that a vol. of Transactions be awarded. It is believed that the diversity in the quantity made from a given number of cows, as well as the quality of cheese from different dairies, is owing not so much to different modes of manufacturing, as to different degrees of care and labor bestowed upon the entire process—no part of which, not even the minor details, can be neglected without more than a corresponding loss. It is important therefore to the owner, that from milking the cows to packing the cheese, constant care and vigilance be practiced.

The committee would call the attention of dairymen to the new mode of cheese making which is practiced to some extent in Ohio, where the curd is collected from 1000 to 1200 cows kept on many farms, and the cheese made in what may be called a cheese factory. Whether this new mode affords any advantages over the ordinary method is a question on which the committee do not purpose to give an opinion, but refer to it as a subject well worth the consideration of the dairymen of Herkimer county.

Roswell A. Rider's Statement.—The animal heat taken out of the milk by cold water under the vat, then warmed up to 85°, add rennet sufficient to curd the milk in forty minutes, but not very solid, then commence breaking up with hands carefully; as soon as it is well broken, apply the steam to keep the heat up to 80° thirty or forty minutes, curd kept continually moving, then raise the temperature to 95° for thirty or forty minutes, just as the curd requires to draw the whey and leave the curd in a state to drain and not leave it so soft as to become salvey and white whey to run too much, (as it must a very little,) but never so hard as to squeak between the teeth; then break up fine, add one pound of dry common salt to 35 lbs. of curd before getting very dry, as it breaks and manages much easier after salting, mixing ten minutes, then put to press; press twenty-four hours, four tons upon 100 lbs. curd.

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Marl.—Analysis of a specimen of marl from Cedarville, Herkimer county, furnished by Mr. A. L. Fish:

	Unburned.	Calculated without CO_2 and organic matter, or after being burned.
Organic matter,.....	19·20	
Silica,.....	1·10	2·23
Alumina, iron and phosphates,.....	0·45	0·91
Lime,.....	46·45	94·12
Magnesia,.....	0·45	0·91
Carbonic acid,.....	31·05	
Potash,.....	0·55	1·12
Soda,.....	0·35	0·71
Chlorine,.....	trace.	trace.
Sulphuric acid,.....	trace.	trace.
	99·60	100·00

Note. The above analysis made by J. H. Salisbury, at the laboratory, Albany, for Mr. Fish, shows that a very valuable marl exists on Mr. Fish's farm. It is represented to be very extensive and its value for manure upon soils to which it is adapted will prove very great. There are doubtless in many parts of the State deposits of a similar character, whose value for farm purposes may be ascertained by subjecting them to an analysis, and as the spirit of inquiry and investigation is aroused in this State, it is presumed that many such will be examined. Farmers can in this way often secure valuable fertilizers on their own farms which will greatly conduce to the increase of their crops, and add largely to their profits. J.

JEFFERSON.

The Annual Fair was held at Watertown on the 26th and 27th days of September, and it was more numerously attended and more interest manifested than at any previous meeting. There were presented on the show ground in competition for premiums, 113 horses and the quality fully sustained the reputation of one of the best counties in the State, for the raising of that noble animal; also 101 cattle, some of them showing an improvement over former years, more attention is being given to the improvement of neat stock; also 30 swine and 59 sheep. In the agricultural hall were exhibited for premiums, 77 fancy

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articles, 144 specimens of fruit and vegetables, 140 specimens of domestic articles, 61 agricultural articles and 43 specimens of the dairy. And at the winter meeting were presented 34 specimens of grain, vegetables, &c. Making in all the number of 800 articles and specimens presented for premium, exclusive of 20 farms and 34 dairies. The above shows a large increase over any preceding year. The treasurer's report shows the following account, viz:

Balance of 1848,.....	$319 82	Winter premiums, 1848,.	$34 00
From the State,.....	183 00	Fall premiums, 1849,....	539 50
From members and admission to hall,.....	536 25	Bill for contingencies, ...	76 75
		Printing, &c.,.....	52 00
Proceeds of Fair Ball,..	71 46		
Books sold for premiums,	22 50		

This shows a total receipt of $1,113.03 and an expenditure of $702.25, leaving a balance in the treasury of $430.78.

That a vast and increasing interest is manifested in the progress of agriculture in this county needs no other argument to prove, than to attend one of the Jefferson county fairs. Probably not less than 10,000 persons were present on the 26th and 27th, exhibiting the utmost harmony and good feeling, always the characteristic of the American farmer.

It would be gratifying to me if I could comply with your request in furnishing answers to your circular. But until some more definite and certain method is adopted, we cannot arrive at the certain results wished for. I see no better way than that *the town assessors each year* shall be required to collect those facts which would be of the most importance to the farmer and public also.

The principal productions of this county appear to be cheese, butter, beef, pork, corn, oats and barley. Great quantities of fish are caught on the shores and bays of the lake and form an important trade in the winter, being put up in barrels and sent to market. The average yield of crops has been light in consequence of the season. The rains in the spring months caused a medium crop of grass, but the crops of grain were much shortened by the dryness of the summer months. Potatoes have not been affected with any disease this year, as far as my knowledge extends, and in some towns this season the crop has been unusually good. The manufacture of maple sugar in this county is on the decrease. There has been great destruction of the maple tree by the catterpillar worm, which, together with excessive tapping, has caused the death and decay of thousands of the sugar maple trees. The quantity and quality of the cheese and butter made in this county

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is on the increase. The probable average per cow this season is less than last; it may average 300 lbs. of cheese and 115 of butter to the cow. The culture of choice fruits is on the increase, and judging from the specimens exhibited at the county fair and at the winter meeting, would show that this county can successfully compete with more favored localities in the quality if not in the quantity produced. I find that the circulation of agricultural papers and writings is rapidly increasing. Still there are thousands who *do not* and a large number who *will not* take or read them. I also find that in proportion *as the science of agriculture is understood and improved*, that success attends the efforts of our agricultural society.

The annual meeting of the society was held at the court-house, on the 24th of December, 1849, and premiums were awarded on field crops.

Officers for 1850.—For President, Jason Clark, of Alexandria; nine Vice Presidents; Corresponding Secretary, John C. Sterling, Watertown; Recording Secretary, Edward S. Massey, Watertown; Treasurer, O. V. Brainard, Watertown, and an executive committee of ten.

MOSES EAMES, *Prest.*

Rutland, Dec. 25, 1849.

FARMS AND DAIRIES, 1849.

The committee, whose duty it has been to examine the farms and dairies offered for premiums in this county, report: That in the discharge of the interesting duty assigned to us, we passed through fifteen towns, traveled over two hundred miles, and viewed twenty farms offered for premiums; examined nineteen cheese dairies, the produce of five hundred and sixty-four cows, and fifteen butter dairies, the produce of three hundred and twenty-two cows.

We were every where received in the most friendly and cordial manner, and entertained with that hospitality characteristic of the farmers of Jefferson county. The best feeling was every where manifested towards this society, and the beneficial influence which has resulted from its operations, was strikingly evinced by observing the spirit of competition and improvement which has been enlisted, in the way of competing for premiums; or, we might say, for the distinction which it has awarded when one or two farmers in a neighborhood lay out their farms into square lots, fenced with stone wall, or good rail fence with stakes and caps, eradicated the thistles and weeds, not only from their farms, but the roadside; build a good and convenient farm-house and out buildings, arrange the yard and garden with good taste, *it begets a*

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spirit of improvement, which exerts an influence throughout a whole neighborhood.

We are happy to state, that the tillage husbandry in this county is undergoing great improvement, that the benefit to be derived *from deep plowing* and *thoroughly pulverizing the soil*, is becoming to be appreciated. The unparalleled drought which has been experienced the present season, has awakened the attention of the farmers to this subject; where lands have been stirred deep and the soil well pulverized, so as to retain moisture, in many cases near an average crop has been produced; but where the surface only has been worked, and that, as is often the case, imperfectly done, the yield has not in many instances been sufficient to repay the expense of harvesting. One farm that we examined, and which, in our opinion, gave better returns for the labor and expense bestowed upon it than any other that came under our observation, the owner attributed his success in raising good crops this season, *to deep plowing*, informing us that he usually plowed his land ten inches deep, so that it was well pulverized, and the manure thoroughly incorporated with the soil; and he intends next season to use the sub-soil plow. The produce of this farm gave evidence of the superior method of cultivation. There is, undoubtedly, much soil in this county that would not be benefited by the use of the sub-soil plow, or by being plowed to the depth of ten inches; but there can scarcely be a doubt that it has been, and is now to a considerable extent, a prevailing error with the farmers of this county, in *not stirring the soil to a sufficient depth to retain moisture for, and give free access to, the roots of plants.*

Intimately connected with the subject of deep tillage, is that of preserving and applying manures. There is great improvement being made in this fundamental branch of husbandry. Where a few years ago we saw large heaps of manure occupying the yards and out buildings, from spring until fall, and often for years, exposed to the drenching rains until they were comparatively valueless, we now see (in their proper place) compost, heaps of straw, vegetable mold, lime, and ashes, undergoing proper fermentation, previous to being applied to the soil. This is a business that pays well the farmer, and should be, and will eventually be, carried to a much greater extent by the farmers of this county.

The early rains in the spring and forepart of summer, gave promise of a productive season; at the middle of June vegetation seldom looked better; from that time for nearly six weeks, there was scarcely any rain; the consequence was that all crops that had not got deeply rooted

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and considerable growth previous to the commencement of the drought, were scarcely worth the expense of harvesting. The hay crop gave the best returns, being but little less than the average of former years. There was but little winter grain sown; what there was, yielded much better than that sown in the spring, and was not much, and in most instances, not at all injured by the wheat midge. We estimated the yield of corn, spring wheat, rye, oats, and barley, at about three-fifths of an average crop; potatoes, much less than half the usual yield.

But it is a gratifying reflection, that although the drought, which has been unprecedented in the history of our county, and has reduced the yield of our crops below that of any former year, it has caused no real scarcity, no want or suffering among us. Like the ancient Egyptians, who possessed great skill and reputation as husbandmen, as well as a very productive soil, and in time of general blight, scarcity and famine, people of other countries, possessing a less productive soil, and less skill in farming, used to flee to them for assistance, they *always* having enough for themselves, and some with which to alleviate the wants of others. And so with the farmers of Jefferson co.; they, under the most adverse circumstances, have always enough for themselves and some to spare.

There are now plank roads running in almost every direction through the county; one leading from Sackets Harbor to Watertown, and from thence through the towns of Rutland and Champion, and through the counties of Lewis and Oneida to Rome; others from the northern towns of this county, intersecting it, enabling the farmers of almost every portion of the county readily to obtain access to them, to carry their produce on to the great thoroughfare at Rome; in this way getting it to market much sooner, and in much better order, than to take the circuitous route of the lake and canals, which often takes from three to four weeks to get to market; many articles, butter and cheese particularly, suffering great injury by the delay. After many years of labor, in the way of getting up an interest for, and getting stock subscribed to build a railroad, the plank roads are the first realization of improvement, in the way of communication and transportation, which the people of Jefferson county have ever experienced within its borders. One year ago there were but little more than ten miles of these roads in the county; now, there is about one hundred and forty miles built and in process of building, that will be done before the setting in of winter; one hundred and thirty miles of which have been built the present season, at an expense of over $150,000.

There are many fine herds of young cattle, as well as many valuable horses, raised in this county. But the manufacture of butter

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and cheese is now the great important agricultural interest, and Jefferson county, if not first, has at least advanced to the front rank, among the dairy counties of the State; and the produce of the dairy forms the most important articles of export from the county. There will not be quite the usual quantity made this season, but there is an improvement in the quality, particularly of butter. The specimens examined by us, with one or two exceptions, were very superior.

In the manufacture of cheese there seems to be more difficulty in reducing it to a uniform system, in producing a similar article, from apparently a similar process. We endeavored to collect information from those best qualified to instruct, and to compare the different opinions upon the subject, and briefly point out the defects, (or the reasons for them) which we noticed in our examinations. Where a thermometer was used, we found great uniformity as to the temperature at which the milk was set for cheese, as it is termed, generally from 84° to 86°, the extreme being from 80° to 90°, and scald from 100° to 106°; and a common sized teacup full of salt, to from twelve to fifteen pounds of cheese. But where the figures for setting, scalding, and salting, were the same, we found the results widely different. The most prominent reason for this difference, in our opinion, is the length of time that the curd is scalded, and the time that it is salted; if scalded at 100°, and scalded one hour, it will be as hard, and make as firm cheese, (all other parts of the process being the same) as it will scalded 30 minutes at 104°, or perhaps 106°; and in salting, it requires much judgment. If the salt is put into the curd before the whey is sufficiently drained off, it will drain off with the whey, leaving a lack of salt, consequently a soft, and, to use a dairy term, the huffy cheese; and if not put in sufficiently soon, it will not be properly mixed, making it uneven or knotty. Cheese should be made pretty firm. It is now an article of export, and if made too soft, is not only liable to loss in transportation, but a very smart cheese, bordering upon strong, does not suit the market, a milder article being preferred. We noticed several dairymen making mistakes in this particular, endeavoring to make their cheese quite too soft, supposing it to be more marketable.

We will only add, if the cheese is too soft, scald higher and longer, and add a little more salt, and be careful not to have too much of it run off with the whey. If hard and knotty, put in the salt sooner, almost as soon as you get it in the sink; if this does not remedy the matter, scald less. We have the process, in detail, as furnished by the individual whom we considered entitled to the first premium, but for fear we shall weary your patience upon this subject, we will not give it. It ought to be published, and probably will be.

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According to the rules of this society, no article presented is to be awarded a premium, unless deemed by the committee to whom it is presented, worthy of it; and no article to receive a higher premium than it is judged entitled to. Acting under these rules—although many or most of the farms presented for our inspection, were in a good condition, in a condition creditable to Jefferson county farming—there was none presented which the committee deemed worthy of a premium, as the "best farm in Jefferson county." A distinction so elevated, should only be conferred upon a model farm, one that is correct and worthy of imitation in all its departments.

REPORT ON SEEDLING POTATOES.

It will be recollected that at the last anniversary of this society, Charles E. Clarke, Esq., exhibited thirteen varieties of potatoes that year, raised from the seed, or potato-ball. These varieties were apparently so good, and as the effort that was made, had in view the arresting, if possible, that mysterious disease so destructive to the potato crop, the society awarded a premium, and recommended to Mr. Clarke, to continue his experiments.

At the present anniversary, Mr. Clarke has presented again the same thirteen varieties; they are now large and very handsome potatoes, and we are informed, that neither last year, or this, has any disease affected them. That up to the time of digging them, which was on the 25th of October, the vines were perfectly green and thrifty.

Mr. Clarke has also exhibited fourteen other varieties of potatoes, raised from the seed this year; many of which are good sized, edible potatoes, weighing five ounces each. The size of these potatoes, is so uncommonly large, that we inquired of Mr. Clarke his mode of raising them. He states, that he selects the ball from the choicest varieties of potatoes; as the balls from good potatoes are far most likely to produce choice varieties—that he washes the seed clean from the pulp and dries it—that he sows the seed in a hot-bed—and as soon as the weather will permit trsnsplants, putting one in a place. Mr. Clarke thinks that in a favorable year, he could raise pretty good potatoes from the seed—and by looking at the experiment that has been tried, the committee agree with him in the opinion.

"Seeing is believing," as the Eastern proverb hath it, and we therefore exhibit some of the samples of these potatoes—and we agree with Mr. Clarke in opinion that new and vigorous varieties are less subject to disease than old ones, and we recommend attention to this subject.

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PORTABLE STEAM ENGINE FOR FARM PURPOSES.

Made by Hoard & Bradford, Watertown. This engine is a beautiful piece of mechanism of half-horse power, working to a charm, at an expense of but a few cents per day, for fuel, &c. It was operated in the hall, and attracted great attention. It propelled a grind stone, lathe, straw cutter, &c., working with ease at from 500 to 800 revolutions per minute. With it a farmer might saw his wood, cut his straw and hay, grind his tools, steam his potatoes and other feed with the surplus steam, and while thus operating save the labor and board of two or three men. It is well worthy of careful attention, and if durable, of general encouragement. It requires from 1 to 1½ cents worth of fuel per hour to propel it, and costs only $75.

EXTRACTS FROM THE ADDRESS OF MOSES EAMES, ESQ., PRES'T OF THE SOCIETY.

Object of Farming and Growing Stock—Cows for the Dairy, &c.

Now the object of farming is to secure the largest income from the least amount of labor and fatigue, and, in order to accomplish this, we must not take it for granted that we have arrived at the end of all knowledge on this subject. The wisest have yet much to learn; and if there lives the man who can teach us any thing new and relieve us a trifle of this eternal torture of fatigue, hard work, and especially of that ignorance which is the mother of slavery, let us go far and listen patiently to hear him. Gentlemen, bear with me, I do not attempt to introduce to your notice subjects new; "I am a plain blunt man—I only speak right on; I tell you that which you yourselves do know," yet there are subjects which if we know, we do not sufficiently regard.

The growing of stock is a subject demanding your attention. The farmers of Jefferson have been and are far behind their neighbors in the selecting and raising of the best breeds of cattle, indeed the dairymen of our county have, to a great extent, rather discouraged than fostered this interest. They do not wish to raise stock; at most not to a sufficient extent to make it an object to incur the necessary expense and trouble of improving their breeds. Then again there is a diversity of opinion on this subject; some preferring the Durham, some the Devonshire, and others the Hereford. But, without doubt, there is abundant opportunity and necessity for improving our present stock, as well for the purposes of dairying as for slaughter. We should deem it an easy matter to add twenty-five per cent to the dairies of this county, clear of all expenditure of time and money, by improving the quality of the cows.

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It is believed that there is no dairy in the county, consisting of ten cows or more, which does not show a difference of one-third in the yield of milk from the best to the poorest cow in the yard, yet the same amount of food is consumed by the poorest as by the best. Now to keep an inferior cow through the long winters of this northern region with the prospect of only obtaining a two-thirds yield in the summer, we hold to be the most miserable policy in the world, it is a sufficient deduction in any case, from the gross income of the dairy, to feed and properly tend upon the best cow we can raise or buy.

Tribute to the late Col. Edmund Kirby.

It is fair to say, that we are not totally deficient in intelligence and enterprize. There are among us men good and true who have devoted and are still devoting their time, energy, talents, and money for the advancement of the social, educational, and agricultural interests of our county. Such men deserve our thanks; they are the benefactors of their country, age, and race. It is with feelings of deep regret and sorrow that we drop any of their names from our roll of brotherhood. One, however, has fallen from our midst, the present season. Col. Edmund Kirby, is one of those honored names that should not be forgotten. In 1843, he was elected President of this Society, and ever felt a deep interest in its advancement. His private virtues are written in our hearts; his public deeds will bear the scrutiny of all who shall peruse the pages of their country's history. We were justly proud of him as a member of this fraternity, as our countryman, and as a member of our community. He was one of us, and no interest of ours was of small moment to his benevolent heart. As regards our present prosperity, like the Patriarch of old, he desired to see our day; he saw it and was glad. He has fallen full of honors, and lamented especially by those who shared the honor of his acquaintance and friendship. And fellow citizens, when we have labored long and faithfully for the advancement of the interests of our country, our common country, we may be satisfied with the record of a life like his, and content to die as he died—at peace with his God and all the world.

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LEWIS.

The Fair was held at Turin, 20th and 21st September. The weather was exceedingly fine for such an occasion—the sky clear and just of that temperature which makes September a charming month. It was attended by a very large concourse of people, who manifested much interest on the occasion.

The cattle on exhibition were superior in number and quality to the exhibition of any previous year, and showed conclusively in connection with the other articles presented an increased interest in the improvement of agriculture. It is to be hoped that hereafter there will be a full representation both of manufactures of various kinds and of the products of the county.

The address before the society which secured the undivided attention of a large audience was delivered by Hon. Charles E. Clarke, of Jefferson county. The spirit of deep inquiry, of sound practical observation and judgment, the scientific nature of the researches, the timeliness of the suggestions, the beauty of illustration, the wit and sarcasm which occasionally sparkled like dewy flowers among more ordinary productions, and the judicious and sound observations in regard to home industry, all contributed to make this a truly great agricultural address, one every way honorable to the speaker and the society.

At the annual meeting held 20th December, premiums were awarded on field crops. Indian corn, S. D. Mason, 82¼ bushels per acre. The following officers were elected for the year: Hiram Mills, President, Lowville; Harrison Blodget, N. J. Beach, Samuel Brinkerhoff, John Benedict, Major Coe, E. A. Brown, Vice Presidents; S. P. Mills, Recording Secretary; Harrison Barnes, Corresponding Secretary; Moses Smith, Treasurer, and an Executive Committee of five.

S. W. NORTHROP, *Secretary.*

LIVINGSTON.

The Annual cattle show and Fair of the Agricultural Society of this county was held at Geneseo on the 4th and 5th days of September. The weather was pleasant, and quite early in the morning of the first day and until noon, the avenues leading to the show ground were crowded not only by the numerous visitors to the fair, but by a large

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number of domestic animals owned by the farmers of the county, and brought up for exhibition at this annual agricultural fair. The prejudice against agricultural societies which for years past has troubled many of our farmers, seems to have nearly subsided. The marked improvement in the farm stock of our county, since the formation of the agricultural society, is so convincing that it is now generally conceded that the objects of the society are worthy of attention, and should receive countenance and support. A very laudable ambition to have the credit of owning and exhibiting the best animals seems to prevail, and is extending into all ranks and classes of our agricultural community. The improvement in agricultural products is not the only benefit derived from our annual fairs. At these gatherings, husbands and wives, sons and daughters, rich and poor, from all parts of the county, meet on common ground, where new acquaintances are formed and much valuable information gathered from the free and cheerful interchange of views on matters connected with the various objects of the society.

The two days devoted to the annual fair have indeed become the great holidays of the year, and for weeks before the time arrives, thousands are looking forward to it with an anxiety which eight years ago could not have been anticipated except by those who had witnessed the effect of similar proceedings elsewhere. From the formation of our society up to the present year, there has been a steady increase in the number of animals annually exhibited and an improvement, in the quality of the various kinds of farm stock exhibited which reflects much credit on the farmers of our county.

At the fair in 1848, the number of cattle exhibited was 172. At the late fair 293 head of beautiful cattle were on the ground, showing an increase over the number exhibited last year of 121. To speak of the fine forms and excellent qualities of a portion of these animals, and omit to give a particular account of another portion, would seem to reflect discredit on the latter portion, which would be improper. Justice to all concerned would seem to require that the whole lot of cattle on the ground be spoken of as a herd of unusual beauty and excellence. Durhams were the most numerous and are esteemed more highly by the farmers of this county than any other breed. Devons, Herefords and natives were on the ground, many of which attracted particular attention.

The exhibition of horses was good, 82 in all. There were nine pairs of matched horses, all valuable. If any among them deserve particular notice it is a pair of bay horses owned by Mr. H. A. Wilmerding. They were much admired and drew the highest premium. The num-

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ber of sheep, though not large, was highly creditable to the wool growers of the county. Charles Colt, of Geneseo, had on the ground a pen of 20 Saxony ewes, which were admired by all who saw them It was generally admitted that for fineness of wool, size and form of the animals, all taken into account, their equal had never been seen in western New-York. The swine at the fair, as well as those which may be seen at the yards of most of our farmers in this county, clearly show that this department has not been entirely overlooked. Many among us seem to have come to the conclusion that it costs no more to keep and fatten a good hog than a poor one.

The ladies' department on the second day was attended under a large tent procured for the occasion. This part of our annual fair furnished, as usual, many attractions, and to this part of our exhibition are we to a a considerable extent indebted for the very numerous collection of people who were present, and who on all such occasions seem delighted with the great variety of articles to be seen as well as with one another. On account of the extreme drought of the past summer, the exhibition of flowers, though quite creditable to the ladies, was not what it would have been under more favorable circumstances There was almost a failure of peaches and apples in the county this season, consequently the exhibition of fruit was somewhat limited. Articles of domestic manufacture; various specimens of needlework, evidencing ingenuity and taste; horticultural productions, very fine, though not very numerous. Several specimens of *wine* made from grapes raised in the town of York, were exhibited. Mr. McDonald and Mr. Warren, the manufacturers of the wine, are entitled to much credit for the attention they have given the subject, and for the success which has attended their efforts. The wine which they exhibited at our fair shows conclusively, that we may have good wine without sending out of our county for it. Articles of fancy and implements of various kinds showing mechanical ingenuity and skill were to be seen in great abundance.

A plowing match was held on the second day of the fair, under the superintendence of Mr. Wm. J. Hamilton, who was appointed for that purpose. Other duties so fully occupied my time that I was not able to visit the plow-field and therefore cannot give any particulars of the trial.

The crop of wheat, which is the great leading article of produce in this county, was a full average crop, the quality fair, though not quite equal to last year. The price of wheat since the last harvest has varied from eight to nine shillings. Corn, oats, and barley, light, owing principally to the long continued drought of the past summer; the crop

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of hay, fair; potatoes less than an average crop, those planted early small, in consequence of the dry summer, those planted late were brought forward by the fall rains and produced well. At the usual time of digging potatoes the crop was found to be uniformly sound and healthy, and I have heard of but two instances since where there were signs of disease.

The amount of cash awarded as premiums at the fair was $212.

The number of books on hand when our premium list for the year was made out, was as follows, viz:

State S. Transactions,.....	53
American Institute Transactions,.....	25
No. of books,.....	78
Distributed:	
State S. Transactions,.....	32
American Institute Transactions,.....	21
	53

The following statement relative to funds was received from Charles Colt, Jun., treasurer of the society, 9th October, 1849:

Received of H. Swan, former treasurer,.....	$31 12
" for membership,.....	255 00
	$286 12
Paid for printing,.....	$21 25
do use of tent,.....	16 00
do premiums,.....	83 00
	$120 25
Balance in the treasury,.....	$165 87

The following is a list of the names of the officers of the society for the ensuing year, viz: Charles H. Carroll, President; Benjamin F. Angel, Secretary; Charles Colt, Jun., Treasurer.

JEDEDIAH HORSFORD, *President.*

Moscow, 14th December, 1849.

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MADISON.

Officers for 1850.—President, Lewis Raynor, of Cazenovia; Vice Presidents, Elijah Morse, of Eaton, David Maine, of De Ruyter, Sanford P. Chapman, of Lenox; Corresponding Secretary, Thomas A. Clark, of Chittenango; Recording Secretary, Charles D. Miller, of Peterboro; Treasurer, Alpheus Morse, of Eaton.

The Madison County Agricultural Society has closed its eighth year under circumstances which give a gratifying assurance of past usefulness, and warrants the expectation that its future action may still farther promote the prosperity of the section of country through which its organization extends.

The Fair was held at Morrisville on the 19th and 20th of September, and was attended by a greater number of visitors than ever before; forming an assembly such as is rarely seen in a country village, remote from great thoroughfares. One of the most attractive features of these annual gatherings is the promotion and renewal of friendly intercourse and acquaintance among those whose occupation so generally withdraws them from society. The farmer, who for months scarcely passes the limits of his estate, in some secluded valley or retired hillside, finds a double advantage in attending the county fair; extending his circle of acquaintance, while at the same time he gains information of the most practical and useful kind.

While our fairs have been productive of the best results in this way, they have well accomplished their main purpose, of developing and advancing the practical husbandry of the county. There are among our farmers none who follow their pursuit merely for amusement and occupation; and the Agriculture of Madison county is conducted strictly with a view to substantial profit, and for the main object of supporting and enriching the proprietor of the land, who almost universally bestows his own personal labor on his fields. For this reason, the introduction of expensive improvements has been cautiously undertaken, and only to that extent which has promised profitable returns in the present condition of the country. The improvement in stock has therefore been rather by a gradual advance in general quality, than by the introduction of a few very perfect animals.

The same reasons have prevented any very expensive undertakings in the way of subsoiling, thorough draining, and similar practices, and have not encouraged the erection of farm buildings of the most complete and systematic arrangement. Still, the advance in all these re-

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spects has been very decided. At our last fair, the horses and colts exhibited were of great excellence for all uses of tillage or travel, and our cattle have not only been highly creditable to our county fairs, but have repeatedly won high premiums from the State society. The report of the judges on farms, at the fair in September, mentions that on each of two farms to which premiums were awarded, those of Mr. David Hess and Mr. Rufus S. Ransom, about *a mile of underdrains* was in use; and that the buildings of the latter are a model of convenience and substantial excellence. Other examples of thorough and profitable farming may be found in various towns; and as the value of our lands increase, and the buildings hastily erected in the early years of their settlement are replaced by a wealthier generation of proprietors, similar instances will become more numerous every year.

The second day of the Fair was devoted to the plowing match; to the annual address, which was delivered by Gerrit Smith, Esq., to a large and attentive audience; and to business arrangements, including the election of officers. The funds of the Society are in good condition, the treasurer's books showing a balance on hand of $235, without including the State allowance.

I annex to this report a statement made by Mr. Hess, of Fenner, in this county, of the origin of a new and peculiar variety of barley, which originated on his farm in 1844, being the same with which he raised his premium crop, the account of which is forwarded herewith. I have myself raised a crop of it, and am satisfied that it is a better variety than any I have known. A sample of it will be forwarded by an early opportunity, for the inspection of the officers of the State Society, and others interested in the subject.

LEWIS RAYNOR, *President.*

STATEMENT OF MR. HESS, OF THE ORIGIN OF HIS NEW VARIETY OF BARLEY.

The barley on which I drew the first premium, at the annual fair of this county, is a new kind, commonly called the double set barley. In harvesting my crop in the year 1844, there was found three heads growing from one root of the above named barley, which being sowed in 1845, produced one half pint; again in 1846, produced one peck; in 1847, produced five bushels; sowed again in 1848 and produced ninety-six bushels, measured in a sealed half bushel, and weighing fifty-three pounds per bushel. In 1849, from the same, was raised the crop described in the report made to the Society. DAVID HESS.

Fenner, January 12, 1850.

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MONROE.

Abstract of the proceedings of the Society.

The Annual Fair of the society was held in the city of Rochester, on the 26th and 27th days of September. The first day was occupied with the show of live stock, and exhibition of agricultural implements, machinery, &c. The attendance was unusually lage, probably greater than at any previous fair of the society. It was estimated that from four to six thousand persons visited the show grounds.

Compared with former exhibitions in this county, the show of horses, cattle, sheep and swine, was superior. The show of horses was very large and excellent—the number entered being 90—and attracted much attention. The display of stallions and single horses was remarkably fine, while the number and quality of mares and colts on the ground, testified to an increasing interest in the improvement of that most noble of all domestic animals, the horse. Of neat stock the show was good, though the number entered (about seventy) was less than at the last previous exhibition; one gentleman who exhibited twenty-eight head of beautiful grade animals, at the latter, not being "represented." Considering the number presented, however, the animals in each class made a fine appearance, and gave evidence of well directed efforts for improvement. The number of sheep entered was probably greater than at any previous show of the society—certainly larger than at any exhibition for several years past, and attracted merited notice. One gentleman alone, Gen. Harmon, of Wheatland, presented 54 head, (48 bucks and 6 lambs,) principally Merinos, of excellent quality. The number of swine entered, over 50, was also large in comparison with former years, and some of the specimens evinced that the "swinish multitude" were not neglected. The exhibition of agricultural implements and machinery was, as is usual at the fairs in this county, good; although somewhat affected by the recent State fair, and the proximity of its location. Messrs. Rapalje and Briggs, of Rochester, and Mr. H. L. Emery, of the Albany Agricultural Warehouse, contributed largely to the exhibition in this department. Among other articles particularly specified in the report of the committee on implements, the Grain Drills presented are thus noticed: The committee cannot but notice with satisfaction the variety of grain drills exhibited, and the steady improvement going on in those machines, as well as in public

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opinion as to the advantages of their use. No less than six different kinds were submitted to their inspection, four of which originated in this county, and are of recent introduction. The committee dared not venture an opinion of preference upon a bare inspection, as use and experience can only be the true criterion. All are of excellent workmanship, and combine many ingenious devices.

The second day was devoted to an exhibition and examination of domestic manufactures; also fruits, flowers, vegetables, &c., our society uniting with the "Horticultural Society of the Valley of the Genesee." The exhibition was held in Corinthian Hall, one of the most commodious rooms in the State, which was crowded to overflowing; and although an admission fee was charged, many who desired to be among the *ins*, could not gain admittance.

The exhibition of butter, cheese, honey, sugar, and household manufactures, including various articles of ladies' handiwork, of utility and fancy was quite respectable, and in some respects surpassed those of former years. The display of fruits, flowers, and vegetables, was remarkably fine for the season. The members of the Horticultural society contributed largely to each of these departments of the exhibition. The great variety, and superior quality of fruits presented, fully sustained the reputation of our professional and amateur cultivators, and gave additional evidence of the peculiar adaptation of our soil and climate to fruit growing. In their report, the commitee on fruits remark:—It is gratifying to observe that increased attention is paid each year, by all the exhibitors, to correct nomenclature. This year the committee found very few varieties incorrectly named, and they hope the improvement will be as great at the next exhibition, as it has been since the last. This season which has been particularly unfavorable for most varieties of fruit, has not been so for grapes. At no previous exhibition have they been presented in such quantity, or of such good quality. The specimens of *Isabella*, from Mrs. E. F. Smith, gave evidence of proper cultivation, and were very far superior to any native grapes any of us had ever seen. The bunches were large, well colored, and many of the single grapes were as large as ounce bullets. Many seedling peaches were exhibited; among them a free stone from H. N. Langworthy, which has been tested for several years, and proved first rate. It is larger than George the 4th, has the same fine flavor, and resembles it in appearance. Mr. Lyon, of Irondequoit, presented an extra fine white fleshed cling, "Lyon Cling," well worthy of cultivation.

The annual address was delivered by Mr. P. Barry. The subject,

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Horticulture; the remarks able and practical. A copy was requested for publication in the Transactions of the Horticultural society.

ANNUAL MEETING.—*Officers for* 1850.

The annual meeting of the society was held on the 11th of December, 1849. Premiums were awarded on field crops as follows:

Corn.—1st premium awarded to Henry B. Moore, of Brighton, 84 bushels, 13 lbs per acre; 2d, Ira Apthorp, Riga, 88 bushels and 11 lbs, on one acre and 8 rods.

Carrots.—1st premium to Lyman B. Langworthy, Greece, 574 bushels per acre.

The report of the treasurer was submitted, examined and approved. It exhibited a balance of $113.66 in the treasury, and that the financial affairs of the Society were in a prosperous condition, the amount of funds received during 1849 being greater than in the previous year.

Officers for 1850.—The following gentlemen were elected officers of the Society for the ensuing year:—President, Caleb K. Hobbie, of Irondequoit; Vice Presidents, 1st, N. Hayward, Brighton; 2d, F. P. Root, Sweden; 3d, John Row, Riga; Secretary, Joseph Alleyn, Rochester; Corresponding Secretary, James Vick, jr., Rochester; Treasurer, John Rapalje, Rochester.

TOWN CLUBS.

The following resolution was unanimously adopted:

Resolved, That we regard well conducted agricultural societies or clubs, whether State, county or town, as one of the most desirable means for disseminating knowledge and improvement among farmers. That the necessary result of all societies of this kind will be to give to every worker of the soil a higher regard for his profession, making each member a more valuable citizen, a better neighbor, and a wiser and richer man. The information acquired by one farmer, either from reading, close observation, or practice, can be communicated, in a free conversation, to others, and numerous facts of interest to all will in this way be brought to light; the *science* as well as the *practice* of Agriculture will be better understood and appreciated. Entertaining these views, this society has seen with great pleasure the efforts that have been, and are now being made, to form "Agricultural town clubs" in this county; and our friends in Webster and Rush, who have been the first to form town societies, have our best wishes for their success, and we recommend the farmers of other towns to follow their example.

The society then adjourned until the first Tuesday in May next, when a meeting will be held for the purpose of making out a premium list, appointment of judges, &c., for the ensuing annual fair.

D. D. T. MOORE, *Cor. Secretary.*

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MONTGOMERY.

Extracts from the report of the Society.

The executive committee met on the 17th March, and made out and published a list of premiums, to be awarded at their next fair. They again met on the 18th August, fixed the amount of premiums, rules to be observed, and appointed the Annual Fair to be held on the 11th and 12th October. The first day of the fair was very stormy, and the attendance small, which however, was more than made up on the second day in the number of persons attending, and the great number of animals, implements, and other articles exhibited, which far exceeded any thing of the kind presented at any former fair in the county. The ladies department, was exhibited in our large and commodious Court House, which was neatly arranged for the display of fruits, plants, needlework, paintings, &c. &c., and was filled with the useful and ornamental contributions of our mothers, wives and daughters, proving their industry and skill, and which with their own presence, added much to the interest and pleasure of the day. On this day we had a very interesting, appropriate and practical address from Stephen Sammons, Esq., which was much applauded. In the afternoon, the plowing match took place. Nine teams were entered, including two for the purpose of sub-soiling; one by a regular sub-soil plow, which loosens the sub-soil, and leaves it in the bottom of the furrow; the other by a common plow, which throws part of the sub-soil on the top. Both methods have their advocates; the premium was awarded to the latter. The competitors on field crops were not as numerous as expected at the fall meeting, owing to their not understanding or conforming to the regulations required by this and the State Society.

The farming or agricultural productions of our county are of a mixed character, and all the different kinds of grain, fruits, and vegetables, raised in the same latitude, are grown here, and the *science* of Agriculture rapidly improving; showing the beneficial effects of diffusing agricultural knowledge through our State and county societies. The average yield of grain per acre, I can give only from estimates, having no reliable information or statistics to refer to.

Wheat.—Not enough raised to supply the consumption of the county, and not profitable, except on a field now and then of a sharp or gravelly soil. It is often injured by the grain worm and frost, but more frequently by bad tillage. The average may be from ten to twelve bushels per acre.

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Rye.—Since the failure of wheat, much more is sown than formerly, and is profitable; it is commonly sown on pea or oat stubble, once plowed, but yields far better when sown on fallow; yields from twenty to thirty bushels per acre. Rye, corn, and oats, are the most important grain crops raised in this county.

Corn.—The cultivation of this crop is improving, both as to the quantity planted and mode of doing it. It is commonly planted on stubble land, plowed in the fall; some long manure spread over and turned under with a shallow furrow, just before planting; yield from thirty to forty bushels per acre. It is mostly cut up at the bottom before frost, as we have only now found out it is the best fodder we have for all kinds of stock.

Oats.—All our farmers raise considerable for market, of the first quality; sown on stubble or grass land, turned over in the fall. The average yield from forty to forty-five bushels.

Barley.—Not so much raised now as formerly, and mostly on the south side of the Mohawk, on a northern aspect, where it thrives best. Yield, from fifteen to twenty-five bushels per acre.

Broomcorn.—The raising of this crop is on the increase along the valley, and brings from $20 to $30 per acre on the field, when ready to cut. From 800 to 1,000 acres are now planted; about one-fourth of the brush is made up in the county, and the remainder out of it.

Potatoes.—There is not more than one quarter of the land cultivated to potatoes, that was before the rot commenced. This season the disease was very little perceived (except in low or wet places) until late digging, after a heavy fall of rain. They are rapidly rotting in the cellars, but those taken out early and before the rains, do not show hardly any rot, at least it is so in my neighborhood. J. Bearcroft, an English farmer, who drew the first premium, has for two or three years past planted early; took out and pitted or housed when the tops were comparatively green, and lost but few. When from the same plot, same kind, planted at the same time, but *taken up after rain*, he lost the greater part. As yet we have discovered no preventive, but succeed best by easly planting, on dry, exposed land, but not too rich, and dig early, before the fall rains; let them dry well before they are finally secured for winter. We then have about one-third or one-half a crop.

Carrots and Beets.—Each succeeding year adds to the quantity raised of these valuable roots, as our farmers find out their value for feeding all kinds of stock.

Live Stock.—Of horned cattle, we have several good stocks of both native and improved. We have but few large dairies, although the most of our farmers keep from ten to twenty milch cows, and send to market a considerable quantity of first-rate butter and cheese. We also

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breed a good number of valuable light draught and carriage horses, which have been much improved of late years by the introduction of good stallions particularly an imported hunter, (Waxy Pope) who has produced a great number of valuable colts. Our sheep flocks are small, a mixture of the short and long-wooled breeds. The largest portion of the wool is manufactured out of the county; each sheep will yield about 3½ lbs. We also fatten a considerable quantity of pig and heavy pork, about one-half of which is sold and delivered at the different railroad stations, to agents from the east and south. The remainder, except what is retained for family use, is carried off by the farmers to Schenectady and Albany. We also fatten much heavy beef and some mutton, which is also sent east. Our lumber trade has increased much within the last year, in consequence of the several plank roads built within that time, starting at the canal and railroad, and running into the inexhaustible forests to the north.

Our receipts and expenditures are as follows, viz:

Balance on hand,	$49 94
Memberships and donations,	132 50
From Comptroller, State money,	107 00
	$289 44
About two hundred premiums paid,	232 25
Expenses,	42 22
	$274 47
Balance on hand Dec. 25, 1849,	$14 97

The following officers were elected for the year 1850: J. M. Riggs, President; Livingston Spraker, W. U. Chase, Vice Presidents; George Yost, Secretary; C. S. Brumley, Treasurer.

JAMES MACINTYRE, *President.*

NIAGARA.

Abstract of the proceedings of the Society.

Much inconvenience and difficulty has been experienced by this society, since its formation, for the want of suitable grounds and rooms in which to hold its annual fair and exhibitions.

With a view to remedy this evil, the present secretary, at the annual meeting in 1848, called the attention of the society to its wants in this

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respect, and suggested the propriety of a purchase of suitable grounds, and the erection of a convenient building, for the purposes of the society; but as yet no permanent provision has been made. Our Annual cattle show and Fair was held at Lockport on the 16th and 17th of October last, a period of the year decidedly too late to ensure either good roads or fair weather. For several days previous to the fair, the weather was lowry and drizzling, and foreboded anything but a fine day; and on the 16th it commenced raining, and continued during almost the entire day. A large and extensive premium list had been prepared, offering premiums in the aggregate exceeding $1,500; but its publication was delayed until so late a day, that but few farmers could be prepared to comply with its conditions. Notwithstanding all the embarrassments under which we labored, the people came with their horses, cattle, sheep, and swine, evincing an interest in agricultural matters hardly to be expected on this occasion, and proving that the farmers of the Cataract county are "no hot-house plants." The number of animals entered for premiums was as follows: one hundred and thirty-four sheep—Long-wooled, Saxony, Merino, South-down, Leicestershire and Bakewell were the principal breeds; and among them were some fine specimens of sheep, very creditable to our county, and showing an increasing interest among the farmers of this county in both the wool-growing business and the raising of sheep for mutton. Some eighty-eight horses, of various ages, were presented—a number probably exceeding that of any former year—a good proportion of them colts of different ages. Much credit is due to the farmers generally for their laudable endeavors to improve their breed of horses, as every succeeding fair exhibits a decided improvement, among the horses exhibited, over the preceding one. In cattle and swine, there were less in number than on some former occasions: 38 head of cattle and 21 swine were entered on the secretary's books. In character and appearance, the cattle were equal to those of any former exhibition; they were composed of Durhams, Herefords, Devons, and native breed. Among the swine were some fine animals, though nothing worthy of particular remark, except a Russian boar, owned by Mr. Thomas Scovil, of Cambria, a young, but worthy and enterprising farmer.

It is well known that our county is not particularly a grazing county. The even, level surface of the land renders it deficient in permanent water—an indispensable requisite in a grazing country. Wheat is emphatically the staple of our county, and much attention is paid to its growth. Hay and all the coarser fodders find a ready sale at good, remunerating prices; all which tends to prevent a very rapid improve-

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ment in the grazing and cattle raising business of the county. So long as the farmer can sell his hay from eight to ten dollars a ton, and all coarse fodder in proportion, and his coarse grains for cash, at proportionate prices, realizing more for such products than for the stock they would produce, he will not be likely to abandon his field crops and grass growing business, as marketable articles, and substitute therefor the growing of stock; and the change, if any is effected, must be a gradual one. One of the most exciting and enlivening scenes attending a county fair is the plowing match, which came off on the afternoon of the first day, notwithstanding the rain. The field selected for the plowing, next where the stock was exhibited, was crowded with people anxious to witness this exhibition of the farmer's skill.

The second day was devoted to the exhibition of manufactured articles, agricultural and mechanical implements, including household products; and in this department, more particularly than in any other, was felt the want of some convenient room, sufficiently large to allow of displaying the articles intended for exhibition to advantage. Of butter and cheese there was a good show, and of excellent quality. Farm implements were numerous, and of improved kinds. The premiums awarded by the several committees, amounted to $463. The receipts into the treasury since the last annual report, are as follows:

From the State,.....	$93 00
Voluntary contributions,.....	208 96
To which is to be added 120 volumes of Transactions of the State Society, and American Institute, rated at one dollar each,.....	120 00
	$421 96

Expenses are as follows:

Transportation, and boxing the books, and postage,.....	$8 39
Paid for printing, ...	49 00
Expenses on the ground,.....	2 00
	$59 39

Leaving a balance of $362.57, applicable to pay premiums. The first premium on wheat, was awarded to Moses C. Crapsey, of Lockport, 30½ bushels per acre, on 28¼ acres. First on corn, to Willard Weld, of Lockport, 81¼ bushels per acre, on 2 acres. First on barley, to Daniel Newhall, of Lockport, 41 bushels per acre on 9¼ acres. First on potatoes, to Jacob Bunnell, Lockport, 330 bushels per acre; second,

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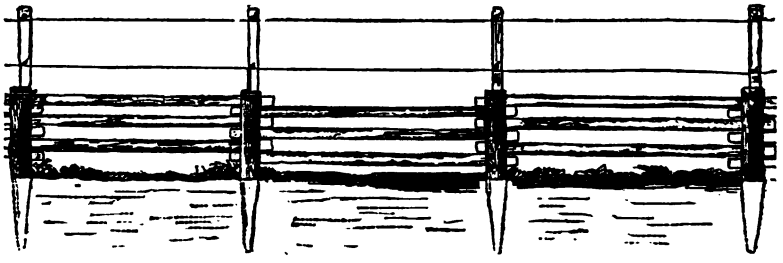
to Caleb Marsh, of Lockport, 250 pushels per acre; third, to George E. Wheeler, of Lockport, 244 bushels per acre.

A. H. MOSS, *Secretary.*

Lockport, Dec. 27th, 1849.

WIRE FENCE. BY JOSEPH TREVER.



I have made eighty rods of wire fence, of the following description, which has effectually protected a field of wheat the past season, from the depredations of my horses and cows, one of which is notorious for breaking and jumping fences.

1. My fence is composed of cedar posts, planted 5 rods apart. 2. Two cedar stakes, one 6 feet and the other 3½ feet long, driven into the ground far enough apart to receive the ends of the rails. 3. Place one end of a rail between the stakes already driven, and at the other end drive two similar stakes, and so on. 4. Lay up two or more rails to each panel. 5. Twist a piece of wire round the short and long stakes to bind them firmly together; this I conceive to be better and cheaper than a wooden cap. 6. Strain tightly the wire from post to post, fastening it round a large nail driven into the post; and proceed thus to the end of the fence; then put up a second wire in like manner; I use No. 10 wire. The first wire should be 6 or 8 inches above the rails, and the second 16 to 18 inches higher. 7. Secure the wire to each long stake by small staples made of the wire. Cost of construction:

16 cedar posts, 7c.,	$1 12
132 long stakes, $1.00 per hundred,	1 32
132 short " 50 do	66
132 lbs wire, No. 10, 8c. per pound,	10 56
13 lbs wire No. 10, for confining the stakes, 8c. per pound,	1 04
6 days work making fence, 75 cts. per day,	4 50
396 rails at $1.00 per hundred,	3 96
	$23 16

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Thus you have a fence for about 29 cents per rod, and if old rails are used, it would cost still less. To make it secure against all animals, a third strand of wire may be necessary, which would increase the cost about 8 cents per rod. A heavy furrow plowed and thrown up against the fence on each side would increase its security.

Advantages of this kind of fence for farm purposes:—1. A great saving of land, by having your fence straight, leaving no corners for the protection of briars, thistles, &c. 2. High winds have no effect on this fence, and consequently, there are no accumulations of snow drifts. 3. And last, but not least, you have a durable fence, needing little or no repairs for years.

ONEIDA.

In compliance with the provisions of the act "for the promotion of agriculture," I report respectfully to your board the transactions of the Oneida County Agricultural Society, for the year 1849.

Our Fair was held in the village of Hampton, on the 26th and 27th days of September. The officers appointed by the society, to see that the necessary provisions for the fair were made, met on the 7th of September and approved the arrangements which the citizens of the village and vicinity had so amply extended to the society.

The officers met on the morning of the 25th, and during the day an unusually large number of competitors had their entries made for exhibition. The ladies department, the products of the mechanic arts, those of the dairy, also fruits and vegetables, were properly arranged under the great tent belonging to the State Society, showing an unprecedented variety of useful and fancy articles to the thousands in attendance. The exhibition of horses, excelled any heretofore held, the number being unprecedented in most of the various classes. Our county produces those of nearly all the intermediate crosses, from the full bred English race horse, to those of the English dray; and for the carriage and road, many of superior excellence.

It is not considered necessary here to go into a minute description of each class of this grand exhibition, as the entries in the secretaries' books in most departments exceed those made at any previous fair, in point of numbers. On the second day, the plowing match took place on the farm of John Townsend Esq., the lot first selected and surveyed out nearer the village having been relinquished for the trial of plows to the

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State society. The piece selected consisted of a gravelly loam, and the ground being very dry, two hours was allowed, the quantity of land being one-fourth of an acre, which was performed within the time required. The competition being animating and close, the performances proved highly creditable without a single exception, showing an increased interest and skill in one of the first and most essential branches of operative husbandry. After the plowing match, premiums were awarded to the amount of $487, in most cases by the unanimous opinion of the committees, by the approval of the public, and by the acquiescence and good feeling of the competitors generally.

The benefits of county agricultural exhibitions, held under the sanction of the State authorities, is apparent, not only to the farmer and mechanic, but to the professional man, the capitalist, and the community at large. Among those resulting from the exhibition of our society, besides those as applied to agriculture, mechanism and the arts, are those which characterise the success of a people and enliven those kind sensations of feeling which add interest to society and benefit to mankind.

Onieda county, situated as she is, in the cental part of the State, with lines of communication through her center, by the most approved means, with a soil partaking of nearly all the various qualities within the State, with the celebrated Trenton falls furnishing her fossils, corals, shells and trilobites, together with her romantic scenery, render her worthy not only of the interests of the farmer, but of the chemist, as applied to agriculture, to the geologist and to those of other scientific pursuits.

I deem it sufficient to say, as I am warranted in doing, that our society was never in a more prosperous condition, and we trust the day will shortly approach *when an agricultural college and pattern farm* will be established by the State, where chemistry, geology, mineralogy, botany and other sciences as applied to agriculture will be taught, and where farmers sons will be taught not only the common branches of education, but those other studies which are specially adapted to their vocations in life. Then a new and permanent light will remove the darkness and prejudice which has so often proved detrimental to American agriculture.

A particular statement of the transactions of the society and its financial condition, is herewith presented in the accompanying report of the secretary. We further submit to you the statements of the successful competitors, agreeable to the provisions of the law.

HENRY RHODES, *President.*

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Abstract Statement of Treasurer's Account.

1849.			
Jan'y 4.	To balance on hand,		$410 41
	Received for 1 vol. Transactions, sold,		1 00
Sept. 25.	Cash of State Treasurer,		255 00
27.	received from the sale of tickets at annual fair,		327 00
	Cash received from members,		402 94
			$1,396 35
Sept. 28.	By paid premiums,	$487 00	
1850.	Expenses,	192 15	
Jan'y 10.	Premiums,	83 00	
	Balance in Treasurer's hands,	634 20	
			$1,396 35

ANNUAL MEETING, HELD JAN'Y 10, 1850.—*Officers elected.*

President, Benjamin N. Huntington, Rome; Vice Presidents, Geo. Bristol, Kirkland, Pliment Mattoon, Vienna; Treasurer, Frederick Ingersoll, Vernon; Secretary, Levi T. Marshall, Vernon, and an executive committee of eleven.

The following persons were appointed a committee to prepare a memorial to the Legislature for an Agricultural college and experimental farm: Ira S. Hitchcock, Vernon; James Rees, New Hartford; George Bristol, Kirkland.

Premiums awarded on Grain.

Best acre of winter wheat, John Thompson, Augusta, 55 bush. 15 lbs.

Best acre of spring wheat, Geo. K. Ells, Westmoreland, 30 bushels, 54 pounds.

Best acre of corn, Pliment Mattoon, Vienna, 96 bushels, 24 lbs.

Best acre of barley, Eli R. Dix, Vernon, 56 bu., 14 lbs.

Best acre of oats, Wm. C. Burritt, Marshall, 81 bu., 2 lbs.

Best grass seed, 141 rods of land, Robert Eells, Westmoreland, 7 bu.

Best acre of rye, Pliment Mattoon, Vienna, 23 bu., 34 lbs.

Best buckwheat, 220 rods of land, Rob't Eells, Westmoreland, 46¼ bu.

Best acre of potatoes, quality and quantity considered, Henry B. Bartlet, Paris, 260 bu., 44 lbs.

Best acre of potatoes, quantity considered, Henry B. Bartlet, Paris, 295 bu., 46 lbs.

Best acre of rutabagas, Pliment Mattoon, Vienna, 660 bu.

Best acre of carrots, Peter Auld, New Hartford, 1,032 bu.

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Winter wheat.—We annex the statement and proof of John Thomson, of the town of Augusta, of one acre of wheat, part of his crop which was measured and weighed separately, and yielded 55 1/6 bushels per acre.

Soil, sandy loam; plowed four times to the depth of seven inches; two bushels of seed per acre; sowed 26th August.

I certify that I surveyed with a compass and chain from a field of wheat, belonging to John Thompson, immediately before harvest, the past season, 20 rods in length by 8 rods in width, being one acre, and placed stakes at the corners thereof, for the purpose, as he stated, of his making application to the Oneida County Agricultural Society for a premium on the same.

HENRY L. HAWLEY, *Surveyor.*

Sworn and subscribed before me this 31st day of Dec., 1849,

T. T. FARMAN, *Justice of the Peace.*

We, the subscribers, do certify that we assisted in harvesting, thrashing and measuring the above one acre of wheat, belonging to John Thompson, and that it produced by measure 53 bushels, and by weight 55,15-60 bushels.

THEODORE T. THOMPSON,
ALFRED HENTY,
JOHN THOMPSON.

Sworn and subscribed before me this 31st day of Dec. 1849.

T. T. FARMAN, *Justice of the Peace.*

VERNON AGRICULTURAL ASSOCIATION.

This association has been in successful operation for the four past years with the most gratifying results; and has from year to year held its annual exhibitions with increasing interest and usefulness. The people of Vernon, who are somewhat proverbial for obtaining the lion's share of premiums in the county and State societies, have demonstrated through this organization the potent effects of association. It is in this way only that the resources of a town or county are brought to the public view. Although there are, doubtless, many towns in the State which have the requisite material for rivaling this town in the display here made at each annual and successive exhibition, yet such material is rendered as invisible as marble in the quarry, unless the legitimate means be used to develope its fitness and capacity. The people of the

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empire State would achieve much in organizing and sustaining in every town in the State an Agricultural and mechanical association, where those of all classes would annually and gladly assemble and exchange friendly salutations. And while the exhibitions of themselves become the source of engendering town pride, they also beget a commendable spirit of enterprize and emulation, which tends directly to the public good. The exhibitions of this society have proved nearly or quite as interesting as our county exhibitions, and in many departments equally as large. About 200 head of cattle were shown at the last exhibition, a majority of which were grade Devons, together with about 30 head, which are said to be pure bred of that breed, originally from the stock of Messrs. Hurlburt, and others, of Connecticut. All the departments were well represented with stock, which was alike creditable to the town and to the exhibitors themselves.

But the great temple of fancy was the "ladies department," in which were to be seen not a few of the "beautiful and lovely," together with an extensive variety of the products of their industry, both of the useful and ornamental. The place selected for this repository, was a church, in which Flora's disciples did themselves honor in the tasteful arrangement of evergreens and flowers, which bedecked the nooks and corners, as well as the more prominent points of the architecture. The annual address was delivered by Col. B. F. Bruce, of Lenox, Madison county, who is not unknown as a convincing, powerful speaker.

Officers of the association.—President, Salmon Case; Vice Presidents, Elijah Wilson, Calvary Wetmore, James H. Dunbar, Isaac Adams, jr.; Treasurer, Sydney A. Bunce; Recording Secretary, Luther R. Foote; Corresponding Secretary, Levi T. Marshall.

We would say to the people of other towns in the State, organize your town associations; they will not only prove a social institution, but efficient and valuable auxilliaries to our county and State societies.

L. T. MARSHALL, *Cor. Secretary.*

ONONDAGA.

The Annual Fair of the Onondaga County Agricultural Society was held at Syracuse, October 4th, 5th, and 6th.

As the weather was very unfavorable, and the curiosity of the people had been so recently gratified, even to satiety, by the exhibitions at the fair of the State Agricultural Society, the number in attendance was

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much less than on the previous year. Still, the exhibition was as good as could be reasonably expected, under those circumstances, and in some respects was superior to any of our county fairs which had preceded it.

The first day was devoted to the exhibition of farm stock. The second to the exhibition of domestic manufactures, farm implements, and the products of the dairy. A short time was also occupied in listening to an excellent address from E. T. Hayden, Esq., a practical mechanic of our county. In the forenoon of the third day, a spirited and well contested plowing match was held between eighteen competitors, two of whom were lads under the age of sixteen years. In the afternoon, a very able address was delivered by Professor R. K. Sanford, of Wyoming. to a large and attentive audience; after which, the officers of the society for the year 1850 were elected, consisting of the gentlemen whose names follow: for president, E. Marks, Camillus; 1st vice-president, C. Moses, Marcellus; 2d vice-president, J. Hansenfrats, De Witt; corresponding secretary, D. L. Pickard, Camillus; recording secretary, E. H. Babcock, Syracuse; treasurer, L. W. Hall, Syracuse. Also an executive committee, consisting of one member from each town in the county and ward in the city.

At a meeting of the executive board, subsequently held, premiums were awarded for 297 bushels of carrots, raised on one-fourth of an acre; also, for 327 bushels of beets, on a like quantity of land. Other crops of grain and roots were offered for premium; but as the persons who applied had not complied with the regulations of the society, none were awarded.

The receipts for the past year, together with an unexpended balance of the previous year, were,.....	$772 64
Amount of premiums and expenses, ...	733 65
Leaving a balance of,.....	38 99

E. MARKS, *President*.

Fairmount, Dec. 31, 1849.

AGRICULTURAL SCHOOL AND EXPERIMENTAL FARM.

At a meeting of the executive board of the Onondaga County Agricultural Society, held at Rust's Hotel, in Syracuse, Feb. 6th, 1850, a committee appointed for the purpose, consisting of T. C. Cheney of Syracuse, James M. Ellis of Onondaga, and Sidney Smith of Spafford, reported the following resolutions, which were unanimously adopted:

Whereas, a select committee have introduced into the Assembly of this State a proposition to purchase a farm of 600 acres, for the purpose of establishing thereon a model scientific experimental school;

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Resolved, That this society cordially approve of the plan proposed by the aforesaid committee, believing that the establishment of such an institution would not only tend to the advancement of the science of Agriculture generally, and to the more rapid development of the native resources of the State, but also that its benefits would extend, directly or indirectly, to all classes in the community.

Resolved, That in our opinion it would be advisable to afford to the pupils in such an institution the facilities for gaining a practical knowledge of the general principles of mechanics, engineering, architecture, surveying, &c., &c., by providing suitable apparatus, teachers, &c.

Resolved, That we recommend to the members of the Legislature from this county that they use their best exertions to procure the passage of an act providing for the purchase of a suitable location and the establishment of such an institution.

Resolved, That the above resolutions be printed in the papers of this county, and a copy forwarded to our Senator and Representatives in the Assembly. ENOCH MARKS, *President*.

E. H. Babcock, *Recording Secretary*.

ONTARIO.

The Annual Exhibition of the society was held at Canandaigua, on the 2d and 3d of October. Many more were in attendance than usual. The exhibition of cattle, horses, swine, sheep, and poultry, was remarkably good, exhibiting in their respective classes, attention to improvement, which was eminently successful. Some of the horses were of peculiar excellence, showing that this noble animal is not neglected, but is being improved from the best stock that can be procured. The second day, devoted particularly to the exhibition of domestic manufactures, fruits, dairy products, &c., was very fully attended. The court house, where the exhibition was held, was crowded during the day, and from the reports of the various committees, the quality of the articles exhibited, was of the highest order. An address was delivered in the afternoon, by T. D. Burrell, of Geneva, full of sound, practical instruction, which was very favorably received, and a copy solicited for publication. Hon. John Greig, President, and Judge Phelps, discussed the subject of an agricultural school and experimental farm, under the patronage of the State, which excited much interest, and the evident approbation of the entire assembly.

A resolution was adopted, tendering the thanks of the society to John Delafield, Esq., for a sample of tiles sent by him for exhibition.

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Officers elected for 1850.—John Greig, President; Elias Cost, Joseph Fellows, Joel S. Hart, William H. Lamport, Hiram Ashley, Vice Presidents; Oliver Phelps, Corresponding Secretary; William W. Gorham, Recording Secretary; Henry K. Sanger, Treasurer.

Butter.—George Rice, of East Bloomfield, made 13 lbs, 14 oz. butter per week from his native cow, 9 years old, she gave about 26 quarts of milk per day.

Grain Crops: Wheat.—Henry W. Wilson, Canandaigua, raised on one acre and 133 rods, 86 bushels, 43 lbs., being at the rate of 47 bushels 18 lbs. per acre, Soules Variety; two bushels seed to the acre, plowed green sward four times, 15 loads leached ashes, crop sowed 7th September. Uriah Beach, East Bloomfield, 47 bushels 8 lbs. per acre; land under cultivation 50 years; had been in grass five years; mowed in July, plowed immediately after, once only, harrowed until completely mellow, drilled in seed 9th September, two bushels per acre, no plaster or manure used about it, Soules variety. John Rankin, Canandaigua, at the rate of 41 bushels, 48 lbs. per acre, on four acres 68 rods, Soules variety.

Barley.—E. M. Bradley, East Bloomfield, 101 bushels on 2 acres. Orin Smith, Farmington, on 3 acres $\frac{4.8}{160}$, 148 bushels, 27 lbs, 46¼ bushels per acre.

Oats.—E. M. Bradley, East Bloomfield, 327 bushels, 12 lbs., on 4 acres $\frac{1.6}{160}$, at the rate of 78 bushels, 3 lbs. per acre. George Rice, East Bloomfield, 78 bushels, 12 lbs. per acre.

Roots: Carrots.—Ira C. Williams, Naples, at the rate of 1486 bushels per acre; D. S. Baker, West Bloomfield, at the rate of 1056 bushels per acre; Elisha M. Bradley, East Bloomfield, at the rate of 728 bush. els per acre.

MR. RANKIN'S STATEMENT.

We give the substance of the statement of Mr. Rankin, as to the method of cultivating his crop of wheat, it being more full than the other statements. It will be seen that all the competitors sowed the *Soules variety* of wheat, which is at present, one of the most popular varieties, and is much approved by millers. Mr. Rankin's farm is in the town of Canandaigua. Four acres 68 rods of wheat. Soil, a clay loam, having a sub-soil freely pervious to water. It had been five years in pasture; was plowed in the fall, 1847, dragged and cross-plowed in June, 1848, dragged and plowed in July. In the beginning of September, the manure was spread on the surface, and plowed under in lands of eighteen feet wide. On the 18th of September, the whole piece was sown with 8 bushels Soules wheat. The manure consisted of 80 loads rough straw yard manure, thrown into a heap, with 20 loads from the

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pig pen of a slaughter house, rotted together for some months. Cradled 10th July, 1849. Cost of putting in the crop, was $99.50, about $22, per acre. Cost of manuring $58.50, ought to be distributed over not less than four years. The amount raised 185⅛⅜ bushels, by weight, (60 lbs. to the bushel.) It measured 182¼ bushels.

ORANGE.

The Annual Fair of the Orange County Agricultural Society for 1849, was held at Goshen on the 26th and 27th of September. The attendance of spectators was very great. The distinguished Agricultural missionary, Mr. Solon Robinson, of Indiana, was among the number.

The exhibition of cattle, horses, and other animals, and of agricultural implements it is believed, equalled, if it did not exceed, that of any previous year. Of agricultural products generally, the exhibition was creditable. The season had been unfavorable for fruits, yet several beautiful specimens were exhibited. Many articles of domestic industry, of surpassing beauty and skill in the manufacture, were also shown, and it is gratifying to state that the fair contributors were present, in person, to witness the admiration bestowed on the attractive specimens of their handiwork.

The plowing match took place on the second day, was witnessed by very many spectators, and was contested with great spirit. Immediately afterward the annual address was delivered, at the Court-house, by the President; reports of committees were read, and premiums awarded.

The following gentlemen were elected officers for the ensuing year: President, Allen M. Sherman, Newburgh; sixteen Vice Presidents and five Executive Committee; Treasurer, Charles Downing, Newburgh; Recording Secretary, Charles Borland, jr., Montgomery; Corresponding Secretary, Hamilton Morrison, Montgomery.

A single remark in reference to the agricultural fairs of Orange county. They are as interesting and as spirited, it is believed, as the fairs generally, in other counties; but are by no means to be received as the proper evidence of the agricultural skill and prosperity of the county. Our fairs may not rank in the highest grade, but there can be no doubt that our county is eminently prosperous, and constantly improving in its agricultural character and resources.

ROBERT DENNISTON, *Pres.*

December, 1849.

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ORLEANS.

The Annual Fair and cattle show for this county was held at the village of Albion, on the 27th and 28th days of September. The weather was unusually pleasant, the roads were in fine order; our farmers had generally got well through with the hurry of early fall husbandry, and the result was, a much larger attendance on both days of the fair than upon any previous occasion. At an early hour on Thursday the streets and public grounds of the village were thronged with people, to an extent hardly ever before witnessed in our village, and before noon it was a difficult matter to find a place for the sole of one's foot. The September term of the Orleans county court being then held, the Albion Academy, with its large halls and spacious pleasure grounds, was thrown open for the accommodation of the society. The assembly room was used as a place of exhibition for household manufactures and horticultural specimens, and some of the other rooms in the building were assigned to the committees, but vast numbers of ladies and gentlemen were compelled to remain in the open air. Never, since the organization of the society, has it seemed to have so firm and deep a hold of the sympathies and good wishes of the farmers of our county, and it has never been in a situation so promising as the present year. Indeed there has been marked and decisive progress every year since the first fair was held, when a mere handful of energetic men, impelled by a noble spirit of enterprise and an ardent desire to advance the permanent interests of agriculture in this little county, which, though among the smallest in the Empire State in territory, is second to none of her sisters in respect to the beauty of its location and topography, the healthfulness and equability of its temperature, the fertility of its soil, and the sturdy industry and enterprize of its farmers. There has been, since eighteen hundred and forty-one, a constant and manifest advancement of our society, in all of its interests, and the annual fair has already become just what its founders intended it should be—the great holiday of the year, a day when the tillers of the soil meet together with their families to exhibit and compare the productions of their industry and skill, and to rejoice over the fruits of their fertile fields.

On the first day was held the exhibition, and there was a fine show of horses, cattle, sheep and swine, together with household manufactures and the productions of the dairy, including many fancy articles of rare excellence and beauty, as well as a vast number and variety of farming implements, with specimens of unusual merit, brought in by our

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mechanics, who seem to vie with the farmers in their endeavors to keep up an interest in our annual fairs. It is not saying too much to aver that in respect to horses, working cattle and sheep, the exhibition was probably equal to that afforded by any other county in western New-York, and in fact *every* department of the show was remarkably well sustained; there was, in fact, but one thing wanted or needed on the occasion, and that was *room*. We hope to remedy that defect another year by purchasing spacious grounds and erecting a building of our own that shall be large enough for our accommodation, and so arranged that *every thing and every body* may be seen to the best advantage without crowding or confusion.

On Friday the plowing match came off upon the grounds of the late Samuel Fitch, Esq., south of the village. Quite a number of competitors entered the lists for prizes; there was a multitude of people present to witness the strife and the whole affair went off well. The plowing was well done and done in good time. In the afternoon the premiums were awarded, the officers of the society chosen for the ensuing year, and an excellent address was delivered before the society by Doct. William Noble, of Albion. Thus ended the annual fair of eighteen hundred and forty-nine. The Hon. Lyman Bates of Ridgeway, was re-elected President; Pierpoint Dyer of Albion, Recording Secretary; Benjamin L. Bessac of Albion, Corresponding Secretary, and Lorenzo Burrows of Albion, Treasurer.

B. L. BESSAC, *Cor. Sec.*

Albion, Oct. 20th, 1849.

OSWEGO.

The Annual Fair of the Oswego county Agricultural Society was held at Mexico, on the 26th and 27th of September. The assemblage was more numerous than on former occasions. A good degree of spirit and interest was manifested in regard to the various productions presented for inspection. The exhibition of neat cattle was tolerably good, but nothing which bespoke any great improvement from the past. It is very evident there is too little attention paid to the importance of breeding from thoroughbred animals. The show of horses was good, particularly brood mares and colts. Some very fine animals were exhibited which clearly indicate that our farmers are becoming somewhat awake to their true interest in this particular. The display of sheep was not very numerous, yet we had a variety of grades, coarse, middle

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and fine wooled, and very fine specimens of each. Very few swine on the ground; the specimens presented were good. The competition on field crops was quite limited, owing in a great measure, no doubt, to the extreme drought the past season. There is an increasing interest in the cultivation of fruits, beautiful specimens of which were exhibited. The specimens of industry and taste displayed in the ladies' department were much as usual. The officers of the society for the coming year are, Hamilton Murray, Oswego, President; Charles C. Tanner, New Haven, 1st Vice President; Peter Devendorph, Hastings, 2d Vice President; James N. Wright, New Haven, Recording Secretary; Jas. S. Chandler, Mexico, Corresponding Secretary; Samuel G. Merriam, New Haven, Treasurer.

JERVIS N. DEWEY, *President.*

OTSEGO.

The Annual Fair and exhibition of the Otsego Agricultural Society was held at Cooperstown on the 3d and 4th of October. The first day was devoted to the exhibition of stock, dairy products, farm and mechanical implements, &c. Although the weather was quite unfavorable the stock began to come in the day previous to the exhibition from the distant towns and every thing indicated a large show. On the 3d (the weather still unfavorable) the stock of all descriptions with implements and other articles for the fair arrived in large numbers and exceeded that of any previous exhibition. The judges on stock were decidedly of opinion that this was the best exhibition ever held in the county, and shows that the influence of the society has been in this respect at least most advantageous. Among the animals exhibited were several of the Short Horn and Devon breed of cattle that were worthy of the attention of those who are desirous of improving their stock. Of milch cows the number exhibited was very large, and the improvement which has been made in this class for the past three years has not been excelled in the State. Otsego, until within some five years past has been almost exclusively stocked with sheep and was noted in the manufacturing districts as raising the best wool in the State, with two exceptions. Owing, however, to the recent changes in our tariff of duties, which has permitted the introduction of woolen goods from abroad, in large quantities, manufactured at less expense than can be done here, many wool growers have given up the raising of sheep and have turned their attention to the dairy. We have hundreds of farmers who milk

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from fifty to one hundred cows, and still it is urged, increase your dairies and discontinue the growing of wool. I am inclined to the opinion that this a bad state of things. If the growing of wool cannot be sustained in the middle and eastern States, so that the farmer can receive a fair remuneration for his investment, it will be relinquished for some other branch of business that will pay. According to the last census there were in the United States twenty-five millions of sheep, producing sixty million pounds of wool, which at 30 cents per pound would give eighteen millions of dollars. Is it wise to destroy this branch of industry, or would it not be for the interest of the country so to regulate our duties that our own industry should be protected? These are questions which deserve attentive consideration.

But I return to the proceedings of our fair. Of working oxen the display was excellent, among them a superior yoke of oxen owned by T. & J. Bundy, which took the first premium here and at the State Fair. There were others of great excellence on exhibition. The show of horses was large and does great credit to those engaged in the improvement of this valuable animal. The exhibition of sheep was not large, but excellent in quality. The swine far exceeded any other exhibition ever held in the county. Never have we had such an exhibition of butter and cheese. Among some thirty competitors it was difficult to determine which should receive the awards. If our navy lack for Orange county butter, let them pay the Otsego dairymen *navy prices*, and I will guarantee them butter that will keep the world over. The exhibition of domestic manufactures which was held at the court-house was unusually large, and did great credit to the ladies of our county.

The plowing match, the second day, was the best we have ever had. After the plowing match a procession was formed, headed by the Cooperstown brass band, and proceeded to the court-house where addresses were delivered by the president and Hon. George A. Starkweather, which were listened to with much interest by a large and intelligent audience.

J. W. BALL, *President.*

Schuyler's Lake, Nov. 1849.

FIELD CROPS.

Wheat.—George W. Deming, 33 bushels per acre, others 30 and 25. *Rye.*—O. C. Chamberlain, 30 bushels, others 28 and 33. *Buckwheat.*—Gustavus White, 41 bushels, others 30 and 29. *Barley.*—Wm. G. Northrup, 57 bushels, others 38 and 33. *Oats.*—Wm. Davison, 81, others 87 and 86. *Corn.*—Abijah Barnum, 93, others 85, 84 and 75. *Peas.*—Jos. Cheney 32, others 25 and 18.

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Officers 1850.—Joseph W. Ball, President; Charles McLean, Secretary; Seth Doubleday, Treasurer; 3 Vice Presidents, and an Executive Committee of sixteen.

QUEENS.

The eighth Annual Exhibition of this society was held at Flushing on the 4th of October. The weather for some days previous had been stormy, and on that morning it rained in torrents until near noon. Of course this must have had a great effect in preventing stock and other things from being exhibited. The display of horses was large and very fine. Of cattle, the show was not large, but there were some very good ones. The working oxen were very fine. There was one train of 50 yokes, many of which were entitled to compete with the best oxen of our State. The display of vegetables was very large and fine. Many of the specimens were of great merit. Of flowers, there was a good display, and many of the bouquets and designs reflected great credit on that Eden of flowers, Flushing. The season was particularly unfavorable for fruits, and the display was less than it would be in ordinary years; still it was large, and some parts especially good. The show of butter was considerable, and all of a superior quality. The exhibition was, under all the circumstances, successful, and was attended by a large crowd of intelligent persons.

We find much cause for regret, that so few of the farmers evince an active interest in the success of Agricultural associations. In almost every case the mass of practical farmers do but little, and the chief burden of labor and exertion falls on a few, and often those in other walks of life. It is encouraging to notice that most of our young men feel an interest in our efforts, and the effects may be seen in the great improvements made by that class of farmers.

Charity Underhill's mode of making butter, to whom was awarded the 1st premium.

The butter I presented for competition, was made within a week previous to the exhibition, and at one churning, and from the milk of four cows. It was churned in a rotary churn; worked it with a ladle until milk was out; then washed it in three waters, and added a small bowl of dairy salt to the 6 lbs. of butter. No saltpetre, or any other material used besides salt; time for churning, early in the morning; a stone pot and cool cellar to keep it in. In winter, churn until froth goes down,

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without any water. In summer, churn until butter is about half gathered; then wash it down well with cold water, and continue churning until all be gathered; after washing the product in three waters, add the salt.

Statement of Margaret Ann Webb, aged 13 years, to whom was awarded the premium for butter, "made by a girl under 21."

The butter was made on the 1st of October; an old fashioned churn used; freed from the milk by washing in 4 different waters; in the meantime working it well, and putting in half an ounce of fine salt to a pound of butter; no saltpetre, or any other substance used. The best mode of keeping it is in an earthen vessel on the cellar floor. A thin cloth should cover the butter, and salt the cloth. The butter was made from the milk of 9 cows. The butter must be well worked at night and the next morning.

RENSSELAER.

Extracts from the proceedings of the Society.

The annual meeting was held in February, 1849. The executive committee convened in March thereafter, and made out their premium list for the year. The amount of premiums offered in the regular list was $1,550. In addition to which, the committees were clothed with discretionary power to award premiums upon articles of rare merit not specified in the regular bills.

A resolution was adopted to extend the accommodations for the Fair by adding to the large buildings already erected for the exhibition of household manufactures, and the finer specimens of embroidery and needlework; one of a similar character for the horticultural and mechanical department, and also a hall for the exhibition of fruits and flowers. For this purpose an expenditure has been made during the past season of $848.76, which added to the amount heretofore expended, makes an aggregate of $2,291.57 laid out for permanent fences and buildings to accommodate the annual fairs. It is, however, found that the increasing growth of our exhibitions requires an enlargement of the buildings, and the Society contemplate the expenditure of some $800 or more for that purpose, the ensuing year. This will make a sum total for buildings and fixtures, of about $2,700, which, it is believed, with occasional repairs, will answer the requirements of the society for many years.

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The treasurer's report, made at the annual meeting, presents the state of the finances as in a fair, if not, under all the circumstances, a prosperous condition.

Whole amount of receipts for the year,	$2,549 28
Whole amount of disbursements,	2,306 63
Leaving in the hands of the treasurer a balance of	$240 65
Add to this the amount due from the State,	180 00
And it leaves a balance of	$420 65
There is still due and unpaid, to competitors for premiums, the sum of	126 00
Which deducted, leaves in the hands of the treasurer,	$294 65

The items which make up the amount above received, are as follows:

Amount received from members,	$736 00
do from sale of tickets at fair,	1,500 28
do from rent of booths, on fair ground,	76 00
do for storage,	55 00
do from the State,	180 00
Total,	$2,549 28

The items which make up the amount disbursed are as follows:

Cash paid F. N. Mann, late treasurer, for money advanced,	$34 81
Paid premiums awarded,	982 00
Paid for buildings,	848 96
Incidental expenses, secretary's salary, &c	440 86
Making whole amount,	$2,306 63

There was also awarded at the last fair, as premiums, 27 volumes of Transactions, and 93 diplomas.

The Society held its annual Cattle Show and Fair on the 25th, 26th and 27th of September last. The exhibition exceeded, in the various departments of agriculture, horticulture, the manufacturing and mechanic arts, any county fair that preceded it. A plowing match was held on the morning of the third day, in which there were eight competitors, who interested a vast multitude in the display of their activity and skill. An able and interesting address was delivered on the fair ground by the Hon. John P. Beekman, of Columbia. It is estimated that during the three days of the fair not less than twenty thousand persons visited the exhibition.

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ANNUAL MEETING, FEB'Y 5.—*Officers for* 1850.

President, L. Chandler Ball, of Hoosick; Recording Secretary, John J. Viele, of Troy; Corresponding Secretary, John Fitch, of Troy.

Mr. Selden gave notice that at the next meeting of the Society, he should move an amendment of the constitution, requiring that the officers of this society shall hereafter be elected by ballot. He should also move an amendment requiring that the treasurer give security for the monies he received on account of the Society.

The Society proceeded to elect vice presidents, four from the city of Troy and one from each of the towns. Executive committee for the ensuing year, Martin Springer, Robert H. Hyde, Isaac T. Grant, Joseph Hastings, B. B. Kirtland, Geo. M. Selden, William Buswell, Le Grand B. Cannon, William Newcomb, Isaac Miller.

The annual address was delivered by the President, E. N. Pratt, Esq. At the close of the address, the newly elected President was introduced to the Society, who made his acknowledgments for the honor conferred upon him. A vote of thanks was tendered to the late president, E. N. Pratt, Esq.

RICHMOND.

It is with much gratification that we record the proceedings of the farmers and others of Richmond county, which resulted in the formation of an agricultural society. There are but few counties in the State in which there is not now an efficient society; and we trust that another year will add to the number the few counties that are without an organization.

According to notice previously given, a meeting was held at the court house, in Richmond village, Monday, Dec. 17th, at 12 o'clock noon, for the purpose of organizing a county agricultural society.

On motion of Dr. Ephraim Clark, Harman B. Cropsey, Esq., was called to the chair, and Frederick L. Olmstead and E. J. Dunning were chosen secretaries.

The chairman stated that the project of forming an agricultural society for the county of Richmond was first started in the "Farmers' Club," which has been in operation for some time past in the vicinity of Richmond village, and that a committee had been formed from that body to take the necessary steps for the calling of this meeting, and to draft a constitution to be presented for its approval.

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The proposed constitution was then read, and its several provisions separately adopted. It is as follows:

CONSTITUTION.

Art. 1. This society shall be called the Richmond County Agricultural Society, and shall be an auxiliary of the New-York State Agricultural Society. Its object shall be to encourage the application of science, skill, and taste to the improvement of Agriculture, Horticulture, and the kindred arts in this county.

Art. 2. Any citizen of Richmond county may become a member, by signing the constitution and paying the sum of one dollar, and may retain his membership by continuing thereafter the annual payment of the same sum.

The payment of fifteen dollars at any one time shall constitute a membership for life, and shall exempt the donor from the annual fee of membership.

The board of managers may elect honorary and corresponding members.

Art. 3. The officers of the society shall consist of a president, one vice-president from each town, a corresponding secretary, a recording secretary, a treasurer, and one manager from each town, who, together with the executive officer of any association which shall become auxiliary to this society, shall constitute a board of managers, any five of whom shall form a quorum for the transaction of business.

Art. 4. The corresponding secretary shall carry on the correspondence with other societies and with individuals, in furtherance of the objects of the society, and perform such other duties as may be assigned him by the board of managers.

The recording secretary shall keep the minutes of the society and of the proceedings of the board of managers, and perform such other duties as may be assigned him by the board of managers.

The treasurer shall keep the funds of the society, and disburse them on the order of the president or a vice-president, countersigned by the recording secretary, and shall make a report of the receipts and expenditures at the annual meeting.

The board of managers shall take charge of, and distribute or preserve seeds, plants, books, models, &c., &c., which may be transmitted to the society, and shall also have charge of all communications designed or calculated for publication, and, so far as they may deem expedient, shall collect, arrange, and publish the same, together with the proceedings of the society. It shall be their duty to appoint, yearly, one member from each town, who, together with the vice-president as the

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chairman, and the manager from the same town, shall constitute a "standing committee," to superintend the concerns of the society in their respective towns, and who may be requested by the treasurer to collect moneys due to the society in their respective towns.

Art. 5. There shall be an annual meeting of the society on the first Monday in February in each year, at the county court house, at which time the officers shall be elected by a plurality of votes, by ballot.

The board of managers shall have power to fill any vacancies which may occur in the offices of the society during the year.

Extra meetings may be called by the board of managers.

Fifteen shall be a quorum for the transaction of business.

The constitution may be altered by a vote of two-thirds of the members attending at any annual meeting of the society.

The gentlemen present then proceeded to sign the constitution, after which, on motion, the society proceeded to the election of president by informal ballot. At the first balloting, Col. Nathan Barrett had a plurality of votes, and was, upon motion of Wm. H. Vanderbilt, Esq., chosen President by acclamation. The following officers were then elected: Haynes Lord of Castleton, J. H. Seguine, Westfield, John T. Harrison, Northfield, D. L. Clawson, Southfield, Vice-presidents; A. H. Britton, Southfield, J. C. Garretzon, Westfield, A. Field, Castleton, Managers; Farnham Hall, Treasurer; F. L. Olmstead, Corresponding Secretary; E. J. Dunning, Recording Secretary.

On motion of James Guyon, it was then resolved, that the managers be requested to draft a set of by-laws, and present them for the approval of the society at its next meeting.

On motion, resolved, that the proceedings of this meeting, together with the constitution of this society, be published in the Staten Islander.

The society then adjourned, to meet at the court house on the first Monday of February next.

E. J. DUNNING, *Recording Secretary.*

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ROCKLAND.

The Annual Fair was held on the 5th and 6th of October, and large numbers of farmers and friends of the society, were in attendance. The exhibitions of animals and articles were more numerous than usual, and of a better quality. The mechanics of the county added very much to the interest of the exhibition, by the number of agricultural implements they presented. The plows, corn-shellers, &c., were of the most improved kind, and well calculated to aid the farmer in the work of the farm. The floral department was quite extensive, and highly creditable to the ladies; and the needle work, &c. exhibited at the Fair, gave us increased assurance that hereafter our Fair will be more interesting. The Isabella grapes, pears, and quinces, were of the most approved varieties; and their size and flavor gave evidence of the care and attention of the growers. Samples of wheat and flour were highly creditable to the county. The show of horses and cattle was large, and among them many noble specimens of strength and beauty. The first day was devoted to the show and an address by Wm. T. Frazer, which was most appropriate and instructive.

Treasurer's Report.

Cash rec'd from members,.....	$41 50
" " State Treasurer,.....	36 00
Balance from last year, ...	26 49
	$103 99
Cash paid premiums,.....	$39 25
Printing,.....	10 00
Forwarding Transactions,.....	1 00
Fencing posts, &c., ...	2 50
Balance on hand, ...	51 24
	$103 99

Fifty-two volumes of Transactions paid out as premiums.

Officers for 1850.—I. M. Dederer, Blauveltville, President; Isaac Barnes, James Suffern, Jacob J. Eckerson, Vice Presidents; Isaac Sloat, Blauveltville, Corresponding Secretary; Erastus Johnson, Spring Valley, Recording Secretary; John E. Hogenkamp, Treasurer; John W. Felter, John R. Coe, Matthew D. Bogart, A. Thompson Blauvelt, Exec. Committee.

I. M. DEDERER, *President.*

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SARATOGA.

In compliance with the act of the Legislature of this State, passed May 5th, 1841, the President of the Agricultural Society reports: That owing to the indifference hitherto existing among too many of our farmers towards this society, very little competition has been witnessed for premiums on crops. We are happy to inform you, however, that a better feeling is abroad in our county, and another year we hope to be able to report as largely upon this as any other department connected with our exhibition.

The farmers of this county are improving wonderfully in the art or science of cultivating the soil. Lands which a few years ago were sterile and unproductive, and regarded as hardly worth cultivation, are being reclaimed; the light sandy soils, which, two years ago, were looked upon with disfavor, and remained uncultivated and neglected, by an economical and judicious system of tillage, are now classed among the best farms in the county. While it costs more to manure, it costs much less to work them, and, in the end, crops are raised with quite as much profit to the cultivator, on the sandy soils of this county, as upon the rough, stony farms in other parts of the State.

In the cattle and stock department we are not behind other societies. If not quite as *numerous*, the cattle exhibited at our county fairs are quite as *good* as those of neighboring counties, and this branch of agricultural industry is in a very prosperous condition. A laudable spirit of emulation is abroad, and our farmers are awake to the importance of stocking their farms with the very best breeds introdued into this country.

Agricultural associations are doing much to improve the condition of the farmers in this part of the State. Instead of looking upon the cultivation of the soil as a degrading, disreputable employment, it is now regarded as the most honorable and dignified pursuit of man. The distaste which a few years ago led many of our young men to abandon their farms and seek employment in the counting-house, or choosing the less laborious professions, is giving place to the more sensible idea that the pursuit of Agriculture is the best, the most elevated, the most healthful, and withal the most certain way to independence and substantial prosperity, that they can follow.

The farmers of this county are becoming the most independent class of community. They are generally free from debt and pecuniary embarrassments, and instead of being borrowers, they are now the moneylenders to those who seek to live without labor. They are no longer

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obliged to sell their surplus productions at such price as the merchants or consumers may dictate; and if what they can sell does not command a price to suit them this year, they are generally in a situation to hold on until the next. Their influence is every where beginning to be felt, and their usefulness appreciated. If the past legislation of the country has been adverse to their interests, they have the power to correct it; and the National and State governments are beginning to see the importance of promoting Agriculture, as well as other interests of their country. The impetus given to the cause of Agriculture by our State and county agricultural societies, is every where felt and acknowledged; and we have only to persevere in keeping up and sustaining these organizations, and in collecting and diffusing the useful information drawn from our agricultural shows and exhibitions, to make the cultivation of the earth and its kindred pursuits the most *honorable*, as it is the happiest occupation of man.

The society in this county has done something, and is destined to do much more, to foster and encourage the spirit of emulation among the farming and agricultural population. It numbers some five or six hundred members, and is on a more substantial and enduring foundation than it has been hitherto. Its affairs are managed by an executive committee of two in each town, together with a president, two vice-presidents, a treasurer, and two secretaries, chosen annually from the society at large.

The Executive committee held its first regular meeting during the past year, in March last, (at the court house, where all its regular meetings are to be held,) and prepared and published a premium list, inviting competition from the farmers, manufacturers and mechanics of the county. They also invited competition on animals, and articles exhibited from other counties, but limited the amount of premiums to be paid to applicants from other counties to the aggregate received from that source; so that the contributors to the society's funds by citizens of our own county would not be drawn by people of neighboring counties. The premiums offered by the committee during the past year, amount to between $500 and $600. As a general rule, the third premium offered was either a copy of the Transactions of the State Society, or a volume of the Albany Cultivator for the following year, at the option of the fortunate applicant. By this means we succeed in circulating these valuable publications among a class of farmers who might not otherwise see or read these useful works. Our first and second premiums are always payable in money.

The sub-committee or judges were also appointed at the March meeting. The committee also at this meeting decided to locate the society's

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Annual Fair at Mechanicsville for the period of ten years, to enclose the show grounds, erect suitable buildings, &c., for the exhibitions, and to charge for admission thereto. After appointing a committee to select the grounds, direct and superintend the erection of the buildings, designating Wednesday and Thursday, the 19th and 20th days of September, 1849, as the time for holding the Annual Fair; the time subsequently changed to the 5th and 6th of September.

THE ANNUAL FAIR.

The ninth Annual Fair and Cattle Show of the Saratoga county Agricultural Society, was held at Mechanicsville on Wednesday and Thursday, the 5th and 6th days of September. The whole of the first and the forenoon of the second day, were devoted exclusively to the exhibition. It was much the best exhibition in every department, the society has ever held. The experiment of charging for admission to the show grounds was eminently successful. The receipts for admission at 12½ cents for each person amounted to $403.60. This must have admitted at least 3200 people, and probably many more, as the payment of fifty cents would make an individual a member, and thus give admission to his whole family. The show of stock, household articles, fruit, flowers, and vegetables, was exceedingly good; indeed every branch of the exhibition was well sustained. The time, the place, and the arrangements chosen for this interesting festival were admirable. The show grounds are on a beautiful lot of some 3 or 4 acres, on the west branch of the Hudson river, and command a fine view of the river and valley for miles in either direction. The show buildings are substantial and well designed for these exhibitions. Through the liberality of the Messrs. Vernams and Judge Quackenboss, the society has received a lease of the grounds free of rent for ten years. The buildings, fences, &c., erected at an expense of some $550 or $600, were all done by the voluntary contribution of the citizens of Mechanicsville and vicinity, and the society is much indebted to them for the goodness of the exhibition.

The afternoon of the second day of the fair was devoted to the reading of the treasurer's report, with the proceedings of the executive committee for the past year, the reports of the sub-committees, the awarding of premiums, the election of officers, and in listening to an eloquent, interesting and practical address, from the Hon. Samuel Cheever.

It appeared from the treasurer's report, that he had received by way of contributions for memberships, since his last annual report, and for admissions into the show grounds,

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The sum of,	$526 20
Amount in treasury at the date of last annual report,	99 62
State appropriation of 1848,	121 00
	$746 82
From which he had paid for premiums and incidental expenses,	224 34
Leaving,	$522 48

Applicable to the payment of premiums, and the incidental expenses of the current year. The doings of the executive committee for the past year were read, and ratified, and confirmed by the society. The reports of the committees were then read, recommending premiums on the various things specified in the premium list, and amounting to about $400. These reports were adopted, and the premiums were awarded thereon. Several amendments were made to the constitution, and the following officers were elected for the ensuing year:

Seth Whalen, Milton, President. Lewis E. Smith, 1st Vice President, Samuel R. Garrett, Ballston, 2d Vice President; E. W. Lee, Ballston Spa., Treasurer; Clarence Vernam, Mechanicsville, Corresponding Secretary; J. A. Corey, Saratoga Springs, Rec'ding Secretary; with an Executive committee of two in each town, and making the whole number of the committee, forty-six, any nine of whom, may constitute a quorum for the transaction of business. The address of Judge Cheever, was listened to with evident satisfaction and delight, by a large audience of ladies and gentlemen; farmers, and farmers' wives and daughters of this county. Upon its conclusion, a vote of thanks was tendered to the speaker, and a copy of his address was requested for publication. This request was complied with, and the excellent views and suggestions of Judge C., were spread before the people, through all the public journals of the county. The next stated meeting of the executive committee, was held at the court house, on the 10th day of December, 1849, for the purpose of awarding premiums on such crops and productions as were not in a condition to compete for premiums at the annual fair. The competition at this meeting was rather slim. As has been already stated, the farmers of this county have manifested too much indifference to this branch of the society's exhibitions. Only four premiums were awarded on crops.

By order of the President.

J. A. COREY, *Secretary.*

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Timothy and Clover Hay.—Joel Root, Saratoga Springs, two acres, 10,996 lbs. well cured hay.

Winter Wheat.—Joshua Mandeville, Waterford, 3 acres, three quarters, and 14 rods of land, yield 94 bushels; expenses, $104.73; proceeds of wheat and straw, $141.00.

Potatoes.—J. W. Baffinton, Half Moon, one acre, 427½ bushels.

Broomcorn.—Isaac Van Vechten, Waterford, had 60 acres in broomcorn in one field. The ground was a quack and timothy sod, (Hudson river flats,) had not been plowed for several years, part of it had been mowed. It was plowed once, dragged twice, no manure put upon it. The broomcorn was planted with Tull's planting machine; an improved cultivator was passed through it the first time of plowing out; the second time with the same cultivator with the wings reversed, and dressed over with the hoe. The whole expense of raising the broomcorn, per acre, was $6.15.*. Two acres of this field were adjudged by John Morrison and John Graham, to yield 800 pounds to the acre, and the whole 60 acres, from six to seven hundred pounds per acre. Affidavits of Isaac Van Vechten, John Morrison and John Graham to the above.

* This probably does not include the expense of securing the crop. The expense for cultivating and securing the crop will amount to $10 or $12 per acre, on an average. Six hundred pounds per acre is considered a very fair yield in this State, and probably higher than the average of the crops.

SCHOHARIE.

The Schoharie County Agricultural Society held its Annual Fair on Thursday and Friday, the 11th and 12th of Oct., at Middleburgh. Preparations had been made for a large and interesting exhibition. The officers of the society had erected a large tent and prepared all necessary accommodations. It is much to be regretted that the first day of the fair was one of the most unpleasant we have had in a long time; we had a violent north-east rain storm, and those at a distance, with a few exceptions, who were intending to exhibit stock were prevented from attending. However, the exhibition of the various animals and articles usually brought out on such occasions, was much larger than could reasonably have been expected under all the circumstances.

The articles of domestic manufacture were extremely creditable to the ladies of the society. The number of swine and sheep were not large, but there were some very good specimens. Much of the interest was cut on the second day of the fair in consequence of the inclemency of

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the weather. The plowing match was necessarily omitted. The society will be compelled to adopt the rules of the State Society in relation to the measurement of field crops; no certain result will be obtained unless the entire acre of ground be measured accurately, and the products of the acre definitely ascertained.

On Friday afternoon the society met at the Lutheran Church, the president, George Manning, Esq., in the chair. The meeting was opened with prayer by the Rev. Jacob West. The address of Judge Rosseter was listened to by a large and gratified audience. It was to the point, and well calculated to stimulate our farmers to increased zeal in their noble work.

Fruit.—The display of fruit, though limited, was worthy of all praise. Dr. James Van Gaasbeck presented a great variety, comprising many kinds of apples, quinces, pears, peaches and grapes. Nathaniel Manning, Esq., presented a tempting display of rich and luscious fruits, most tastefully arranged. P. S. Danforth. Esq., presented a large variety of fall and winter apples, which the committee are of opinion would compare favorably with the like productions from any part of the State. Volney Danforth presented a few specimens of a variety of apples called the "Alexander Apple," both in size and quality they would be difficult to beat. The entire exhibition in this department was of the highest character, and gives evidence of increasing interest in the cultivation of superior fruits.

The next fair appointed, to be held at Schoharie Court-house.

Officers 1850.—B. McNeil, Carlisle, President; L. Sanford, Middleburgh, Chas. Knox, Esperance, N. T. Rosseter, Blenhiem, P. M. Stryker, Conesville, George Goodyear, Cobleskill, Vice Presidents; S. Hosack Mix, Schoharie, Secretary; Ralph Brewster, Schoharie, Treasurer.

Extracts from the address of Hon. N. T. Rosseter—Agricultural Education.

But it is not alone, Mr. President, in the specific education that enables the farmer to excel in his peculiar department, that greater reform and progress are needed. It is in the acquirement of that general knowledge which shall place him upon a level with those classes who, certainly by no "divine right" control his destiny and influence his actions. In the United States, there are over five millions of farmers, and about seventy thousand professional men, and yet with all this vast preponderance of physical and numerical power, how "few and far between," the instances where they have the temerity to assume the exercise of those powers, save through the delegated authority so tenaciously claimed by their professional rulers. The farming interests can

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at any time control the State or general government, and give tone to public opinion, and yet how rare it is to see the various offices of honor, trust or profit filled by any of their own number. I rejoice that there are exceptions. The farmers of Schoharie may well be proud, not only that from their ranks was selected the first farmer Governor of this great State, but that the dignity and ability of his administration lent additional lustre to an office that had been filled by a Clinton, a Tompkins and a Marcy.

It is a truth, too trite almost for repetition, that physical power unaided by intellectual attainments, ever works as the willing tool of the ambitious and designing. Intellect, perfected by education, is the great lever that is constantly raising man nearer to the great source of all intelligence; without education, man soon sinks to humanity's lowest level; with it, he controls his brother man, evokes the slumbering energies of the elements, annihilates space and time, and finds no heaven too high for the soarings of the "God-like mind." In an address delivered some years since, by one of the wisest and purest of modern statesmen (Hon. Edward Everett, of Massachusetts) the following remarks on this subject occur. So felicitous in their expression, and at the same time so forcible and appropriate their application, that I cannot hesitate a moment in submitting them to your consideration:

"It is at once melancholy and fearful to reflect how much intellect is daily perishing from inaction; or worse than perishing, from the false direction given it in the morning of life. I fear we do not yet fully realise what is meant when we speak of the improvement of the mind. I fear it is not yet enough considered by legislators or parents, that there dwells in every rational being an intellect, endowed with a portion of the faculties which form the glory and happiness of our nature, and which, developed and exerted, are the source of all that makes man to differ essentially from the clod of the valley. Neglected and uncultivated, deprived of its appropriate nourishment, denied the discipline which is necessary to its healthy growth, this divine principle all but expires, and the man whom it was sent to enlighten, sinks down before his natural death, to his kindred dust. Trained and instructed, strengthened by wise discipline, and guided by pure principles, it ripens into an intelligence but a little lower than the angels. This is the work of education. The early years of life are the periods when it must commonly be obtained; and if this opportunity is lost, it is too often a loss which nothing can repair. It would be more rational to talk about not affording seed-corn than to talk about not affording our children as much of their time as is necessary for their education.

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What! shall a man plant his field and allow his child's intellect to run to weeds? And to confine them in the morning of their days to a round of labor for the meat that perisheth, is it not when our children ask for bread to give them a stone: when they ask for a fish to give them a serpent, which will sting our bosom as well as theirs?"

SENECA.

The seasons of seed time, vegetation and harvest of the present year, have been strongly contrasted, with the same periods in the year 1848. It must be profitable to record these changes, and bring them strongly to the remembrance and consideration of the agriculturist. The absence of rain, from the month of May until October, was an unusual feature in this climate. In that period of about four months, a few slight showers only passed over this county, very limited in extent or duration; and the results are now apparent in diminished crops.

REPORT OF THE PRESIDENT.

The agricultural condition of the county of Seneca through the past year (1848) has been much improved. The cultivation of the soil has received more careful attention than for many previous years, and the barn yards and manur eheaps are better managed. A necessary consequence is, cleaner fields with larger crops. Seneca county is more devoted to the cultivation of wheat, as a principal product, than any other grain, yielding annually about 550,000 bush. The cultivation of Indian corn has increased within two years, and may be estimated this year at 400,000 bushels. The oat crop is unusually large, amounting to about 400,000 bushels. Barley is not extensively cultivated, but may amount this year to 120,000 bushels. Heretofore the Hutchinson wheat has been preferred to other varieties, and fully maintains all its excellencies. The Soules wheat has been much increased, and finds additional advocates from year to year. During the past season, many farmers have cultivated a wheat from Ohio, which has yielded a good return, but needs more experience to be adopted in competition with the Hutchinson or Soules varieties. The product of this county in wheat will average about twenty bushels per acre; and as compared with the crop of 1845, the excess of this year is equal to fourteen per cent.

The demands for Indian corn for export in 1847, has given an impetus to the cultivation of that grain hitherto unknown in this county. Until within a year or two it was a neglected plant. Many farmers

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doubted the appplicability of the soil to a full development of corn. Now, however, it seems, that large crops, yielding a high average, are produced. The quantity raised in 1840 was 178,674 bushels; in 1845 we produced 205,000 bushels, and the crop this year is probably 400,000 bushels. The average yield per acre is 32 bushels, and fast increasing, as we have many farmers who produce 60, 75 and 80 bush. per acre.

The oat crop, as stated, is very large and good this year, the opening spring having been very favorable. As an example, the town of Lodi produced, in 1845, about 26,000 bushels of oats, and this year the crop in that town is 50,000 bushels. The adjoining town of Covert will present an equal yield of this grain. In 1845 the oat crop was 292,397 bushels; this year the county produces 400,000 bushels.

Barley has deteriorated in this region generally. The quality of the barley produced this year is believed to be inferior to that of last year, and the grain less in weight per bushel. The straw, when harvested, exhibited a shortness and feebleness unknown heretofore. This grain has not at any time been a favorite object of cultivation in this county, and probably receives less attention than is due to it. As a crop, it consumes from the soil a far greater amount of its riches than the more valuable wheat plant; yet by a proper cultivation, the product per acre of barley may be raised so high as to give an equal profit with wheat, and prove a powerful aid to the farmer as a spring crop, occupying his ground little more than three out of twelve months. The deterioration of the seed in this section, has induced the attempt to introduce, direct from England, the *Cheltenham Barley*, which is a variety of the six-rowed, and said to weigh over fifty pounds per bushel, at all times. The average yield of barley this year will not exceed twenty-one bushels per acre.

Rye is favorably cultivated in the towns of Junius, Tyre and Waterloo, where our enterprising farmers have a lighter soil than other portions of the county. The crop exceeds the usual average about one-fifth; it is not large, as the more important articles of wheat and corn take a prominent precedence.

The very favorable state of the atmosphere during the spring months, and at the season of the hay harvest, enabled the farmers to secure more than an average crop of hay;—probably one-third more than the previous year. An annual loss is incurred on this crop, by the too late in-gathering of the timothy hay. As this grass ripens here, generally, at the period of our wheat harvest, it is cut too late; that is, not until the seed has nearly ripened, and when the straw and leaf has parted

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with most of its nutritious powor. Either a greater supply of agricultural laborers, or more perfect agricultural labor-saving machinery must be presented to remedy this annual loss. The crop this year, may be estimated at thirty-eight thousand tons.

Buckwheat is raised to some extent, and frequently as a green crop for plowing into the soil as a manure.

The potato crop has suffered much from the disease usually called the rot; a disease beyond the comprehension of any one in this section, and without any known remedy. There are several farms on which it has not yet made its appearance, while on the farms adjoining, it appears in its most destructive form. Neither the mode of cultivation, the composition of the soil, or the position of the ground, or the observations of careful men, offer any reasonable conjectures for results so widely different. The whole crop of the county this year, will not probably much exceed two hundred thousand bushels.

Flax has for many years been a source of early income, and the proprietors of oil mills have offered inducements for its cultivation; as, however, the exhaustion of the soil by this plant is from year to year better understood, the cultivation falls off; in several towns of this county, it is wholly abandoned, for it is ascertained that the elements of flax make a heavier draft on our soils for the growth of the plant, than any other, and without giving any compensating return; while for its proper cultivation and full development, it requires a high degree of manuring, which can be applied with more enduring benefits to the cereal than to the oil producing seeds.

Much and increasing attention is given to the propagation and production of the best varieties of fruits; extensive orchards have been planted during this year, and more careful pruning of the older orchards has been practised. One of our excellent farmers in Seneca Falls has established a peach orchard of great extent, besides other fruits; another enterprising farmers in Fayette, has planted an extensive pear orchard; so likewise in every town in the county, has every choice variety of fruit been cultivated and extended. For many years the apples of Seneca county, have found an extensive demand and ready sale in Albany and in the city of New-York, at an average cost here of 25 cents per bushel.

There is one exception to the general and successful propagation of fruit; the plum trees have suffered severely, and in some places have been totally destroyed by the worm, which causes the unsightly excrescence commonly called here "the black blotch." Timely care and pruning. would probably have prevented this disaster, and we have

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reason to hope that our farmers will hereafter examine into, and study the causes of such frequent and mortifying losses, most or all of which are inflicted by the insect tribe. And here I would state that we have from time to time suffered much from the Hessian fly, and the grain moth; their ravages have in many instances been extended to our crops of barley. The grub and the wire worm annually diminish the profits of many of our industrious farmers, and as often do we quiet our murmurs by the comfort of hope for exemption hereafter; a vain hope, unless we cautiously examine the habits and changes of the countless insects which naturally infest our fields and crops. This remark is called for, because notice of late has been drawn to the destruction of grass in meadows, wrongly attributed to defect in the soil, for the insect aphis has been found in numbers beyond enumeration, all of them feeding on the herbage of the field. That the remedy is within the easy reach of the farmer there can be no doubt, and there are many who from precaution do not suffer materially. We owe many thanks to the several gentlemen connected with the State Agricultural Society, for the information derived from them upon this subject, and indulge the hope that the agriculturists of this county will benefit by it, and in time add to the knowledge on record It may well be doubted whether any particular variety of wheat is exempt from the attacks of the insect tribe; the same variety which was reported to withstand their ravages during one season, has fallen before them in another.

In this wheat growing region the dairy receives that attention only which will supply the farmer with the needful milk and butter for his establishment, and it may be stated that the county produces a quantity barely sufficient for the supply of its population. The product of butter in 1845, was 816,000 lbs., giving an average of about 34 pounds per head, per annum, to each inhabitant. The quality of the butter is generally excellent, causing a demand which will naturally affect a better supply.

The stock of Seneca county is good; the prevailing breeds being the Durham or Short Horn, from stock imported from England, and also Devonshires. The cross of these cattle with our native cows, is found to produce good milkers. Much attention is paid to the breeding and raising of horses, and they improve yearly.

The sheep of this county are, for the most part, merinos of fine wool; the fleeces average 3½ pounds each. The low prices of wool the present year, has induced many farmers to reduce the size of their flocks, a course probably improvident, for upon a careful examination of the subject, we have reason to believe that a remunerating benefit can be derived, even at present prices. More careful foddering of the flocks

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under shelter through the winter months, and more economy in the mode of feeding, will probably meet the difference in the market values of wool. The number of sheep in 1845, was 72,000; they now amount to 71,000.

Swine offer very little inducement for their propagation, except to consume the offal of the farm. The stock mainly consists of Berkshire, Byfield, and the common swine. Recently a boar and sow, direct from China, have been introduced into the county, and a cross established with the Berkshire; the result is a breed called "Tonquins." They have the small bone of the Chinese sow, consume but little food, lay on fat very readily, and at the age of about fourteen months they average about three hundred pounds each, running at large.

The introduction of well constructed farm machinery and implements, has undoubtedly contributed much to the improved condition of this county, and enables the farmers to obtain larger profits by means of the great *saving of manual labor, and of time.*

Among the most important of these machines, is Hussey's reaping machine, many of which were used here for the first time during the last harvest. By the aid of this reaper, with the previous use of the cultivator, named below, *several* farmers have been able *to raise* and prepare their wheat *for delivery*, in perfect order, at a cost varying from twenty-six to thirty cents per bushel.

The cultivator alluded to, was introduced amongst us by Mr. Tracy, of Newark, in Wayne county. It is an improvement on Ide's patent, which our farmers find an admirable implement; 23 were put into active use through the last season.

The recent improvement of the plow, by Mr. Burrall, of Geneva, and other men of sound scientific and mechanical knowledge, has materially abridged our labors in the field, while the stock feeder has been no less benefited by the corn and cob crusher of Pitts and Sinclair; and the valuable portable grist mill of Ross & Co., of New-York, by means of which the food for a large stock of cattle is prepared in a short time, as well as meal and flour for domestic use. Another advantage has been obtained from the use of Ross & Co.'s mill, by converting all the foul seeds collected from the wheat crop by the fanning mill, into a highly nutritious meal and food for cattle, thus avoiding the re-production of pigeon weed, cockle, summer grass, &c.

An attempt has been again made, to collect the agricultural statistics of this county, under the auspices of the county society; the returns or reports from the several towns are transmitted herewith. They are not presented as entirely correct, and must be received as the nearest approach to the truth which can be had until the Legislature shall adopt

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the easy and more accurate method of annual returns from the whole State, through the instrumentality of the town assessors.

The great importance of information thus derived, must be admitted by all, for it is the test and very foundation of the principles of political economy; it gives us the condition of our whole State, and the comparative advantages of each county, By this knowledge spread before us, we more readily avail ourselves of the benefits enjoyed by our sister counties, and impart to them any peculiar benefit possessed by our own. True, this is a very narrow view of the importance to be derived from official reports of the condition of our State, but even this renders it very desirable.

From the several town reports a table has been compiled, and herewith transmitted, exhibiting the principal products of Seneca county for the year 1848, the number of acres devoted to the several crops, the quantity of seed sown per acre, the quantity raised per acre, and the cost of production per acre. From these data and others given, the profits derived from each crop are ascertained and noted, both per acre and per bushel. In the estimation of the profits, neither rent or interest on the cost of the lands has been included. Various valuable inferences may be drawn from a careful investigation of this table.*

Thus you have a general view of the agricultural condition of this county, which, if incorrect, will be found to err in the endeavor to undervalue quantities. The gradual improvement of cultivation is manifest, and a commendable strife for excellence and neatness in our agriculture, is openly showed by very many of our excellent farmers.

The Annual Fair and Cattle Show did not draw out as large a number of our farmers as upon some former occasions; nor could it be expected that they would drive their cattle and other stock through roads rendered very heavy and wet, by a continuance of rain for several days preceding the celebration. Nevertheless, the exhibition was highly respectable and interesting. The annexed report of the Secretary details the proceedings of the society.

The Treasurer's account and vouchers have been forwarded to the Comptroller of the State, and exhibit an amount of cash received from

members equal to.....	$192 25
From the Treasurer of the State,.....	74 00
Making the aggregate receipts to be,.....	$266 25
The amount of premiums and expenses paid, is.....	221 61
Leaving a balance in the Treasurer's hands, of	$44 64

* Vide Trans. 1845, p. 557.

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In conclusion it must not be omitted to state, that the distribution of the Transactions of the State Society is shedding a vast benefit on this county. They are sought with avidity, and perused with care and industry, causing discussions and inculcating lessons not to be derived from other sources. This annual work from the State Society has, in very many instances, provoked an appetite for agricultural and horticultural knowledge, and induced many to seek more frequent contributions of facts connected with farming; and thus has been the means of extending the thinking and reasoning class of men who examine the pages of THE CULTIVATOR, THE GENESEE FARMER, and other publications so zealously devoted to our farming interests. From these sources science is made to confer lasting benefits upon us, driving away and steadily diminishing the misty, baleful influences of ignorance and empiricism.

J. DELAFIELD, *President.*

During the summer, much interest was excited in relation to plows, and scientific manufacturers and others seemed desirous to arrive at some criterion, whereby to judge of the value and relative merits of the many offered for the use of the agriculturist. Seneca county was selected as a convenient and central point, at which all interested might assemble.

REPORT ON THE TRIAL OF PLOWS.

To the President and Members of the Seneca Co. Agricultural Society:

Gentlemen: When we received the notice of our appointment to ac as judges at the trial of plows in Seneca county, we felt in common with our farming community, the importance of the movement, and the benefit to arise from a careful, judicious accomplishment of the purpose.

As practical farmers, accustomed to the plow and its use, we feel justified in presenting a few remarks in connexion with the matter before us, for the consideration of the farmer and the mechanics who are disposed to aid us in the proper arrangement of the implements we need in our vocation, and more especially the indispensable and important implement, the plow. We think it has been long evident that caprice and accidental circumstances have given rise to a large catalogue of plows, which, upon trial, have disappointed the hopes and wasted the means of the purchaser. Of this class of plows, few, perhaps, have been constructed by makers having a knowledge of the *use* of the implement, and but little of the skill or science necessary for the construction of a *good* plow.

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There seems to be another error, also, prevalent among plow-makers generally, too often adopted by farmers, boding evil to our agricultural success, or at least to a thorough and proper tillage of the soil. We allude to the frequent attempts to produce plows which shall, by turning broad furrows, work over two acres per day; gaining time at the expense of the necessary breaking up and essential pulverizing of the soil. Thus, farmers are tempted with plows to turn furrow slices of 14 to 16 inches in width, while the depth rarely exceeds 5½ inches. We will not deny that circumstances may exist where a broad furrow of 12 inches and more in width *may* be useful; but, as a general principle, greater *depth*, with pulverization, should be the main object of the plow-maker; the second effort being to overcome resistance with the least power.

We feel strong in the opinion, that large masses of soil turned over in furrows of fourteen inches in width by six inches deep, must require a large outlay of subsequent labors, to render the soil pliable and in fit condition to receive manure in a well mixed state. Neither will the land so treated be in a state to afford thorough nourishment to the seed deposited, from the manures intended for it. The gain of time, therefore, in rapid plowing by broad furrows, may be and oft times is, an expensive system.

Another error in the manufacture of plows, from which as practical farmers we are called upon to suffer inconvenience, is the imperfect line of draft presented to our teams; not only because this line is not preserved at right angles with the shoulders of our horses, but also because of the arrangement of the beam as attached to the iron frame of the plow body. In this latter arrangement much difficulty appears to exist, and fancy has too much sway; the obliquity of the beam to the line of the land side may be necessary in some degree, to produce a direct line of draft from the true point of resistance, but as practical men we have reason to object to the too frequent need of shifting our guide bolts, and the use of other expedients, to compensate the erroneous line of draft adopted by the makers. We feel well assured that our agricultural mechanics are abundantly skilful, and possess sufficient science to correct this inconvenience when brought to their notice.

When we consider the object or intent of the plow, we arrive at the fact, that it is to perform in the hands of the farmer the same operation, and to produce the same effect as *the spade*, in the hands of the gardener; that is, to turn over and *thoroughly* to break up the soil. Now, the man and spade, acting together, is a most complex and perfect tool; but the time is yet to come, when a *simple* machine shall be produced to accomplish, with *equal excellence*, the same results as the man and

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spade. We may not doubt, however, from the vast improvements of late years, that such machine will in time be constructed; the talent and science of our agricultural mechanics fully justify such expectations, and the rapidly increasing attention of farmers to the study of their vocation, will act as a stimulus to the inventor and a check upon visionary attempts.

With these prefatory remarks, we now present a report of facts, connected with the trial of plows—facts which offer to every man of thought and observation much matter for reflection.

On the morning of Thursday, the 30th of August, 1849, we reached the ground selected for the trial of plows. The field presented a generally uniform appearance, gently sloping from the east to west; the soil was a clay loam, rather tenacious, as is most of the wheat land of the fertile county of Seneca; the sod was of timothy, with a mixture of clover, and had not been plowed for several years. It should here be mentioned and remembered, that since the month of May last but little rain had fallen in this section of country, which was made manifest by reference to a meteorological table, as well as by the condition of the soil. Nevertheless, as the soil was uniform in its nature, so the resistance offered was relatively the same to each plow, and the trial was alike to all and under like circumstances.

A stationary power had been well placed midway between the eastern and western extremes of a plot of ground 150 feet long; a traveller or guide was prepared to bear and direct the rope, in order that each plow might be directed with precision.

Furrows had been previously opened six inches in depth. The plows were entered in the Secretary's book in numerical order, and called to the trial in the same order.

A substantial Dyanometer was placed in our hands with a certificate from the proper officer that the same had been tested and proved by the State standard, and was correct, indicating a power as high as one thousand pounds.

An extent of ground was carefully surveyed and marked into spaces of 30 by 300 feet, for the purpose of exhibiting the manner in which each plow could perform the work required.

With these and other arrangements, our duties were comparativcly easy; and as no haste or hurry was permitted, we continued our labors through two successive days, strengthened by the hope and belief that we were entering upon a system, which if continued from year to year would in due time work a large and positive benefit.

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The folowing table gives a full and particular statement of the trials, classifying the implements in order, from the lesser to the greater power required to overcome the resistance offered:

By stationary power.—Depth of furrow, 6 inches; width of furrow, 12 inches.

	Pounds.
1. Burrall's Wheel Plow, No. 2,	290
2. " " " 3,	295
3. Lamport Iron Beam Plow, from Ovid,	340
4. Burrall's Wheel Plow, No. 4,	345
5. Penn Yan Plow,	355
6. Burrall's Wheel Plow, No. 5,	356
7. Buckeye Iron Beam,	372
8. Crane Plow, with cutter,	415
9. Burrall's Landside Plow,	427
10. Dundee Plow,	441
11. Burrall's Landside, No. 5,	485
12. Crane Plow, with cutter,	493
13. Waterloo Plow, withdrawn.	
14. An Eastern plow, not regularly entered.	

By horse power.—Depth of furrow, 7 inches; width of furrow, 13 inches.

	Pounds.
1. Burrall's Wheel Plow, No. 3,	489
2. Penn Yan Plow,	493
3. Burrall's Wheel Plow, No. 5,	511
4. Burrall's Wheel Plow, No. 4,	519
5. Lamport Iron Beam,	520
6. Dundee Plow,	520½
7. Burrall's Landside, No. 2,	524
8. Crane Plow,	533
9. Burrall's Landside, No. 5,	673

The trial by horses having been made on the second day, several owners of plows entered, did not appear in time.

The plowing performed by the several implements was good and uniform, evidencing much skill on the part of the plowmen; understanding that the chief object of the trial was to ascertain the true and reliable estimate of the *power* necessary for good work, we do not deem it necessary to particularise the work of any one plow—all were good; and the facts set forth in the above table will enable every man to draw right conclusions and safe estimates.

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Among other facts presented to our notice, were two frames of the Wheel Plow, which had been used for several years; they were worn through the mould board, and the wheel had yielded on its margin, being the substitute for a Landside. On examination, the Journals, or points of the axle of the wheels were sound and perfect.

Having witnessed the excitement among men of science as well as among a large assemblage of practical farmers, convened on this occasion, we respectfully urge upon the farmers of this State, and upon agricultural mechanics, frequent meetings and interviews upon the plan of, and with similar objects, to this meeting in Seneca county. The true intereats of both will be substantially promoted, and science will be more kindly courted to deepen our furrows, to pulverise our soils, and thus add to our general prosperity.

B. B. KIRTLAND, *Rensselaer county*,
ELIAS COST, *Oak's Corners, Ontario co.*
JOHN MALLORY, *Penn Yan, Yates co.*
Judges of the trial of plows.

The President then called the attention of the society to the cases of minerals on their tables, which had attracted much attention during the day, and many inquiries. "These minerals," said the President, "are the fruits of study, bestowed by a young and hard working farmer upon his profession. He had watched the planting, sowing, growth and maturity of seeds; he had helped to manure and turn the earth, when an intelligent, inquiring mind led him to ask, what is soil? what are its elements? why are some naturally fertile, others naturally barren—and why the difference of manures used in farming? how does yard manure produce certain results, and plaster of Paris certain other results? To ascertain these facts, he picked up stones, examined them, and compared them with the soil; he sought information from books, which he considered as the store-house of ideas and facts gathered, and treasured up by wiser men; and thus *he* has arrived at truths, which must make his path, as a farmer, more easy and certain in results for the remainder of his life. If he is present, in this room, he can explain the nature of the minerals you have examined, and we may all gather useful knowledge from the investigations of our laboring fellow farmer."

The young farmer's name is Mr. Alexander Kirkwood, who was a laborer by the month on Mr. D's. farm. He came forward, and by request, explained the study he had pursued, in a manner that would have done honor to a scholar, who has made the science alone, his study and pursuit. We regret that we cannot find place for his valua-

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ble address. This is the right direction for the young men on our farms. When they shall generally, be thus instructed, the pursuit will be one of intellectual pleasure, as well as a healthful and profitable adventure.

Officers for 1850.—John Delafield, President; Israel Lisk, Jason Smith, R. P. Hunt, L. Crowell, F. Yost, J. Wykoff, P. I. Van Vleet, J. De Mott, J. L. Eastman, N. Noble, Vice Presidents; John D. Coe, Treasurer; Henry D. Didema, Secretary.

At the winter meeting—a sample of flour presented for premium, the product of wheat grown in the town of Lodi, weighing 65¼ pounds per bushel, yielding from 60 lbs. of wheat, 48 lbs. 2 oz. superfine flour, 3 lbs, 1 oz. fine, 2 lbs. 5 oz. coarse, 6 lbs. bran and shorts, 8 oz. waste.

The best wheat crop, for which the premium was awarded, was for 41$\frac{11}{16}$ bushels per acre.

SUFFOLK.

The sixth Annual Exhibition of the Suffolk County Agricultural Society, was held in the village of Greenport, the eastern terminus of the Long Island Railroad, on the second of October. The weather proved so unpropitious previous to the day appointed for the fair, that our farmers were discouraged, and consequently the display of stock and produce was far less than usual. The annual address was delivered by Hon. John G. Floyd, who ably vindicated the importance of Agriculture as a profession, and the rights of agriculturists.

The winter meeting was held at Riverhead, Dec. 5th, but no premiums were awarded, the society having adopted a rule not to award premiums unless the requisite statements were furnished. A crop of onions was the best presented for notice, raised by David Jagger, Jr., of Riverhead, the produce of 66 rods, being 215 bushels, at the rate of 518 bushels per acre. The past season was in most respects unfortunate for our farmers, owing to the excessive drought of June, July and August. Wheat was greatly injured by rust, while the rye crops were excellent and abundant. Oats and buckwheat suffered from the dryness of the season, and the yield may be estimated at one-third less than that of the year 1848. The hay crop was good, although not equal to that of two previous years; the average yield may be stated at one and a half tons per acre. Potatoes were affected by the drought, but the disease was not complained of. The heavy rains of September

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and October caused mouldiness in the corn crop throughout the county diminishing its value at least one-third. Our society has reached the sixth year of its existence since its re-organization, and the prospect for a continuance of its usefulness is encouraging, much interest being generally felt in its welfare. The funds of the society are in a flourishing condition, which will enable us the next year to enlarge our list and amount of premiums.

The officers for the year 1850 are—Harvey W. Vail, President, Islip; Alex. Thomson, Secretary, Penataquet; Elbert Carll, Treasurer, Babylon.

H. W. VAIL, *President.*

ALEX. THOMSON, *Secretary.*

SULLIVAN.

The Annual Fair of this county was held in Monticello on the 10th October. The day was unpleasant, but a large number of people, both male and female, were in attendance. The early part of the day was occupied by the various committees in examinations, and the afternoon was spent in hearing the address of M. Low, which was practical in its character, and gave great satisfaction. The exhibition of dairy products, though not large, was highly creditable, and the quality of the butter inferior to none made in the State. The stock exhibited was not very numerous, but in several departments was very good. The stock of neat cattle, comprising oxen, cows, bulls, heifers, steers, calves, &c., &c., was not large, but the animals were very fine. There were a number of superior Durhams and Devons, and the various grades. The specimens of the *native breeds*, however, did not suffer in comparison, particularly the milch cows, which are here considered among our experienced dairymen, as far better than any of the imported varieties. With the same care and attention in rearing, and similar treatment afterwards, as the far-famed breeds have received for many generations, they would be equal to any in bulk, with the advantage of being more hardy and better adapted to our climate.

The ladies department excited much attention, and they are entitled to great credit for the deep interest manifested in our anual exhibition. They are more active and interested than the men.

Crops.—The potatoes, since the first of October, have been much affected by the rot. The unusual heavy rains since that time, it is supposed, has increased the disease. It seems that the disease did not commence in the top, as the vines were entirely dead previous to the

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tubers being affected, and no appearance of disease upon them—having been fully matured before the disease was discovered. The *Yam* potato has enterely escaped this year as heretofore, and when cultivated in the same field with other varieties, has remained sound and good, while other varieties have failed to the extent of one-third and more. Its hardy character seems to be well established. Owing to the severe drought of the present season our crops have suffered severely. Oats will fall at least 50 per cent. below the crop of 1848.

Agricultural School.—The petition for an agricultural school and experimental farm, which accompanies our report, has been readily signed, and could be increased with very little attention to a much larger number. The interest on this subject is increasing, and will lead, it is hoped, to the adoption of measures that will secure the farmers' sons such an education as will enable them rightly to discharge the important duties of their profession.

The *Cheltenham Barley* sent from the State agricultural rooms for trial, was mostly winter killed. What matured, has been sowed, and looks unusually well. A small quantity of *spelt*, recived from the patent office, was sown last spring, yielded well, and appears to be a heavy kind of grain. (This is a variety of wheat grown extensively in the southern provinces of France, in Switzerland, parts of Italy, and in several parts of Germany, in parts of Spain, north of Africa and Cape of Good Hope. Whether it will prove valuable here can be determined only by trial.)

It is suggested that a change of premium seeds from the different counties might be effected through the State Society, by having samples from the several counties deposited in the agricultural rooms. We shall forward some from our county for that purpose.

This being the second year of our society's operations, it is gratifying to notice the increased interest manifested in our association. Its progress will, it is believed, be onward, and great good be eventually accomplished through its instrumentality.

Receipts and expenditures by M. L. Bushnell, Treasurer.

Balance from last year,....	$7 74	Paid premiums, ...	$202 00
State Treasurer,.....	47 00	Incidental expenses,..	7 98
Individual members,.....	160 50	Balance in treasury,..	5 26
	$215 24		$215 24

LOTAN SMITH, *President*,

JAS. H. FOSTER, *Secretary*.

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GRAIN CROPS.

Corn.—Mr. Kuykendall, Mamakating, 90 bushels per acre; Oran Roye, Thompson, 80.

Rye.—Jonathan Hoyt, Thompson, 31 bus.; Joseph Loundsberry, 41 bus. 7 qts.

Oats.—Joseph Huntington, Thompson, 51 bus. 11 qts.; Chas. Smith, same town, 56½ bus.

Buckwheat.—David K. Devine, Fallsburgh, 40 bus.; S. Wheeler, Bethel, 33 bus.; Jonathan Hoyt, Thompson, 50 bus.

ULSTER.

The Annual Fair of the Ulster county Agricultural Society was held on the 27th and 28th of September, in the village of Kingston. The exhibition, although not so large as might be expected in a county like Ulster, was very good. The cattle that were exhibited, were of a superior quality. The plowing match took place on the second day of the fair; the plowing was mostly well done. The best work was done both by oxen and horses, by the plows manufactured by Gifford, of Hudson. The number of specimens of manufactured articles was not large. There were some specimens of fruit exhibited that were very superior. We were disappointed in our expectations in not having B. P. Johnson, Esq., to deliver the address, as was published; his absence being caused by indisposition. In consequence of his absence the address was delivered (ex tempore, without much time for preparation) by Dr. Peter Crispell, Jr., of Hurley.

Field Crops.—We had this year more competition for field crops than last. The premium on wheat was awarded to Jacob H. Deyo, of the town of Shawangunk, 30⅛ bushels to the acre. The second premium was awarded to Elliot Thompson, of Esopus, 27⅞ bushels to the acre. The crop of Mr. Deyo was raised on new land, plowed three times, and sowed two bushels to the acre. Mr. Thompson's was plowed twice —a sandy loam, probably a clover sod. The wheat in both cases was Mediterranean.

The first premium on oats was awarded to Peter Crispell, jr., of Hurley, 85⅜ bushels to the acre. The second premium was awarded to Henry B. Sears, of Saugerties, 84⅓ bushels to the acre. Both crops of oats were raised on corn ground of last year; Crispell having sowed four, and Sears two and a half bushels to the acre.

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The first premium on corn was awarded to Peter Crispell, Jr., of Hurley, 95$\frac{3}{3}\frac{1}{2}$ bushels to the acre: the second premium to John Crispell, of Hurley, 86$\frac{3}{3}\frac{1}{2}$ bushels to the acre.

A premium on rye was awarded to Abraham Roosa, of the town of Esopus, 38 bushels to the acre. His rye was sown after corn on the 10th of October, 2$\frac{1}{4}$ bushels to the acre.

A premium was also awarded to Abraham Roosa, of Esopus, for potatoes, 92$\frac{1}{1}\frac{8}{0}\frac{8}{0}$ bushels to the acre. This premium was awarded, not so much in consideration of the quantity raised from the acre, as for the quality of the potatoes, they being a very superior quality of Mercers, and thereby to induce others to become competitors for raising potatoes. A premium was awarded to Peter Crispell, Jr., for the best acre of hay, although there was no competition; this premium was awarded, he having 7,335 lbs. from an acre. His meadow was an old one, having been in grass for more than twelve years, but was ashed over in the fall of 1846, with 100 bushels of leached ashes to the acre.

The officers for the ensuing year are as follows:

President, Peter H. Brink, Saugerties; Vice-Presidents, Joseph Arnold, Esopus, C. M. Van Buren, Kingston, Philip Hornbeck, Rochester, D. L. Bernard, Plattekill; Rec. Secretary, Peter Crispell, Jr., Hurley; Cor. Secretary, William Cockburn, Kingston; Treasurer, Jonathan D. Ostrander, Kingston.

Dec. 31, 1849. PETER H. BRINK, *President.*

WASHINGTON.

The Annual meeting of the Washington county Agricultural Society was held at the Phenix Hotel in Whitehall, on Tuesday, the 11th day of December, 1849. John H. Boyd, President, in the chair. The secretary being absent, Dr. James Rice, of Fort Ann, was appointed secretary pro tem. M. A. Pike, Esq., and Andrew H. Moor, were, on motion, added to the committee on grain.

On motion, a committee of five were appointed to nominate officers of the society for the ensuing year.

The committee, through their chairman, Ahira Eldridge, reported the following persons as officers of the society for the year 1850: For President, James Farr, Fort Ann; Vice Presidents, Wm. H. Mowry, Greenwich, James Rice, Fort Ann, Lansing G. Taylor, Fort Edward, Harvey Brown, South Hartford, Edward Bulkley, North Granville, Levi Hopkins, Argyle; Corresponding Secretary, John McDonald, Salem; Re-

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cording Secretary, John M. Stevenson, Cambridge; Treasurer, Ahira Eldridge, North White Creek.

The exhibition of articles competing for premiums was very limited. By a change made in the constitution of the Society two years since, premiums upon such articles as were immature or unfit for exhibition at the annual fair in September, were to be awarded at the annual meeting in December. Several kinds of grain crops were entered for premiums, and the committee, through their chairman, S. N. Bush, reported the following: Isaac Wood, of Whitehall, for winter wheat, 37⅛ bushels per acre. This was the only sample offered. We publish the certificate of Mr. Wood in full:

It was raised on a gravelly soil, with porous sub-soil. The situation of the ground is rather elevated and dry, inclining toward the south, south-east and east, being shaded by an average of 29 apple trees of 45 years growth to the acre. Three years ago this ground was producing grass, but on account of the meagerness of the crop, after a ligh sprinkling of yard manure, it was plowed up and planted to corn, producing that year about 40 bushels to the acre. The next spring it was manured lightly, plowed once and sowed to oats, producing that year about 30 bushels to the acre. The oats being harvested, the ground was again plowed and harrowed about the 1st of September last, then sprinkled with a coat of yard manure, averaging 45 wagon loads on each acre, then plowed as shallow as possible between the 17th and 20th of September. On the 20th of September, without further preparation of ground, after steeping the seed in strong brine, then mixing it with air-slacked lime, (as much as would adhere to it,) it was sowed, two bushels of Soules wheat to the acre. It required no subsequent attention until about the 10th of July last, when it was harvested with the sickle, set up in bunches of 15 sheaves each, and permitted to remain until sufficiently dry for the mow.

Current price of grain,.....	$1 50 per bushel.
do straw,.....	02½ pr bundle.
Quantity of straw,.....	204 bundles.
do wheat on one acre,.....	37⅛ bushels.
Value of wheat,.....	$56 62
do straw,,.....	5 09
Total,.....	$61 71
The cost of plowing,.....	$4 00
do harvesting,.....	3 50

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The cost of thrashing,	3 00
do applying manures,	4 00
do seed,	2 00
Whole cost,	$16 50
The value of the same being,	$61 71
The whole cost of crop,	16 50
Net profit of	$45 21

James Farr, of Fort Ann, spring wheat, 31 bushels 26 quarts; net profit, $27 14; wheat of superor quality.

Samuel Wood, of Argyle, oats, 127⅛ bushels per acre, quality superior.

Nathan Jackson, of Whitehall, corn; amount of crop, 92 bushels.

Value of crop,	$63 00
do stalks and pumpkins,	5 00
	$68 00
Expense of cultivation, harvesting and interest on land,	22 50
Net profit,	$45 50

Andrew Wilson, of Whitehall, amount of crop, 91 bushels.

JOHN H. BOYD, *President.*

WAYNE.

The Annual Fair of the Wayne County Agricultural Society was this year, (1849) as a matter of experiment held at two different places, on the 26th and 27th days of September, at Palmyra, in the western part of the county, and on the 3d and 4th of October, at Rose, in the eastern part of the county. All members of the society were permitted to compete for premiums at both places. At each place a larger number of people gathered to participate in and to witness the doings of the occasion, than had usually attended when the Fair was held at but one place, and that a more central one.

The exhibition of stock, grain, vegetables, agricultural implements, and domestic manufactures, though by almost entirely different competitors, was good at each place; as good, doubtless, as though the fair had been held as formerly. The project succeeded beyond expectation. It dr w from home many farmers who had perhaps never before been roused to a sense of the value there might be to them in attending such

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gatherings of the tillers of the soil, and witnessing the result of their industry, and of their careful, useful, and well-timed experiments.

The arrangement of holding the Annual Fairs at two different points in the county, will be followed by this county in future. And on account of convenience of personal attendance and of driving stock and transporting products for exhibition, which as the event in this county shows, are regarded as things of no slight moment, it is suggested, for the consideration of the State, and other county societies, whether a similar arrangement would not conduce to their prosperity.

Wheat and corn are the most important productions of this county. Of wheat, the crop was abundant the past year, and the quality excellent. Of corn, the crop in quantity was much below an average one; and in quality was not equal to that of the crop of several previous years.

The early and continuous rains caused the growth of a heavy burthen of grass; and the weather being exceedingly favorable at the time of cutting, a larger supply of hay was secured than had been before perhaps since the settlement of the county.

The potato crop was below a medium in respect to quantity. The continuous wet weather in the early part of the season, delayed the time, and more or less interrupted the usual manner of planting. And the long drought that immediately succeeded the rains, retarded their growth and prevented their attaining the usual size. Portions of the crop, however, raised on particularly favorable localities, were excellent. The destructive disease known as the "rot," which for a few years previous had been so disastrous to this vegetable, affected it but slightly the past year. And on the whole, regarding the character of the season, both the quantity and the quality of the crop were far beyond what before harvest was anticipated.

The product of the orchard in this county the past season, was extremely meager, and the quality of the apples quite inferior. As to the cause there are various opinions.

Among the agricultural implements exhibited, worthy of notice, was Ide's Drill, manufactured by Samuel R. Tracy, of Newark, in this county. And since the process of sowing in drills is becoming extensively adopted, it is a matter of importance that the most perfect machine for the purpose should become known. For cheapness, simplicity of construction, evenness of distribution, depth of depositing, and perfection in shutting off when turning, it is believed this drill is unequalled.

I herewith transmit a copy of the Annual Address, delivered before the Society at their Fairs, by R. G. Pardee, Esq., of Palmyra; from

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which, if it should not be deemed expedient to publish the whole in the next volume of the Transactions, the following extract from it will be found interesting containing valuable statistics relative to the agricultural capabilities of Wayne county:

"There are twenty-seven counties in our State, containing a larger number of acres of improved land than Wayne county; but only seven counties which raise as much wheat, and only eleven which raise as much corn, and only ten which raise so many horses. When compared with Rochester, we learn from official report of the Canal Commissioners, politely furnished by the collector of this port, that the Collector's Office at Palmyra alone, cleared during the year 1848, nearly half as much wheat, about 350 per cent. more corn, about 260 per cent. more barley, about 300 per cent. more potatoes, and about 300 per cent. more dried fruit. And when compared with Lockport, we find that Palmyra cleared during the same year, 33 times as much pork, 393 times as much beef, as much flour within a fraction, more than three times as much wheat, 36 times as much corn, four times as much barley, 75 times as many potatoes, 30 times as much butter, about 50 per cent. more wool, and nearly 5 times as much dried fruit.

From an examination of the same report, we also learn that the offices in Wayne county cleared during the year 1848, more than 4 times as much beef as all the collector's offices from Syracuse to Black Rock, including Rochester, Brockport, Albion, Lockport, and Montezuma. They also cleared more bacon than Rochester, Brockport, and Lockport together.

We further learn that the offices in our county, cleared, during the last year, within 8 per cent., as many potatoes as the entire State west of us, via the Erie canal, including Rochester, Buffalo, &c., and within less than one per cent. as much barley, as the whole State west on the Erie canal.

We also learn what was to me an astonishing fact, that the offices in Wayne county, during the year 1848, cleared more dried fruit, by more than 30 per cent., than the entire State west of us, to and including Buffalo; and also, more by 15 per cent. than the entire State east of us. The offices west cleared 538,000 lbs.—those east 610,000 lbs.—while Lyons and Palmyra cleared 708,000 lbs., or more than 30,000 bushels.

This is indeed a noble tribute to the industry of the daughters of Wayne county; (for the women and children do the most of this work;) for who can calculate the enormous amount of labor, in drying 150,000 bushels of apples, peaches and plums; this being the requisite amount to make the 30,000 bushels when dried.

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For several years past, the Palmyra office has cleared about 60,000 barrels of fine grafted apples per annum, or 150,000 bushels more of fruit; and if Lyons, Newark, and Clyde together, send off as much more, (as they doubtless do from 50 to 100 per cent. more,) we then have the aggregate of 400,000 to 500,000 bushels of fruit, in a green and dried state, exported annually.

It is proper to add in this connexion, that the Palmyra office receives toll on some of the articles named, which were shipped west of Macedon, and out of the bounds of our county. This is the case also with Rochester, and every other office. But I would ask, is not this more than counterbalanced by a larger amount shipped from the large village of Clyde, which includes to a large extent, the products of those five large and productive towns of our county, to wit, Galen, Savannah, Butler, and parts of Rose and Wolcott, which is cleared, and pays toll mainly east, and out of her bounds—particularly when we add the immense amount shipped from our lake ports of Pultneyville and Sodus.

On reflection, I come to the conclusion, that on a portion of the articles named, if not all, these official statistics present substantially a fair view of the matter; for I notice on referring to the article of dried fruit, of which the Palmyra office is supposed by some to gain largely, by accessions from Monroe and Ontario counties, that the Palmyra office actually cleared less, by more than 20 per cent., than the Lyons office; although it is well known that the Lyons office is confined in its clearances to the products of the four or five central towns of our county, viz: Lyons, Arcadia, Sodus and parts of Wolcott and Rose; while Palmyra receives from Macedon, Walworth, Marion, Palmyra, Williamson and Ontario, except that which goes to Rochester. Yet Palmyra cleared but 160 tons, while Lyons cleared 196 tons; thus demonstrating, that in this article at least, we lose more than we gain from Monroe and Ontario counties, by the strong attractions of Rochester, Canandaigua and Geneva."

I also herewith transmit the report of the committee upon farms and field crops, and the statement of Joseph Watson, of the town of Galen, of his method of farming. At the annual meeting of the society, on the 12th of December last, the following resolution, relative to holding the Annual Fair of the State Agricultural Society at two different places, was adopted.

Resolved, That in view of the great inconvenience there is by reason of distance to those residing in remote parts of the State, in attending the annual fairs of the State Agricultural Society, and in transporting thither for competition live stock and other things, when held as heretofore at one place only, we believe it would greatly accommodate mu-

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merous friends of the Society, and would highly conduce to the promotion of its interest to divide the State into eastern and western districts, and have a fair held annually in each, and we therefore suggest the adoption of such an arrangement.

The officers elect for the current year, are as follows: President, Joseph Watson, of Galen; seven Vice Presidents; Recording Secretary, Daniel Kenyon, of Arcadia; Corresponding Secretary, R. G. Pardee, of Palmyra; Treasurer, James D. Ford, of Arcadia.

Our accounts for the year stand as follows:

Cr.	Balance from last year, 1848,.....	$39 62	
	Cash received for memberships for 1849,..	205 00	
	do from State, ...	126 00	
			$370 62
Dr.	Cash paid for premiums and expenses, ...	$304 78	
	Balance on hand,.....	65 84	
			$370 62

Out of this sum some expenses and premiums are yet to be paid.

JAMES D. FORD, *President.*

Newark, January, 1850.

Extract from the report of the Committee upon Farms. R. G. Pardee, *Chairman.*

Two applications only were presented for premiums; we regret that there are not more competitors, but we are highly gratified with the agricultural prospects of the county of Wayne, possessing one of the best soils that can be produced in the whole State, situated upon the borders of Lake Ontario, with its numerous bays and harbors, with the Erie canal passing through her whole length, with her flourishing villages, the easy access to markets, the improvements in contemplation which we hope may soon be realized. We conceive it to be unfortunate for this community that the subject of farming is so imperfectly understood, and that the best mode of farming has not been known and settled upon long ago; but it is not our vocation to find fault, or look after the imperfections of our friends, but to encourage, and if we can, say something here to stir up the young farmer to increased activity, to arouse his energies, that he may resolve to put his farm in first-rate order, his fences up, his buildings in repair, have his plowing done 20 per cent. better than the last year, the low lands drained, particular regard paid to the best breeds of animals, and those kept of good quality and condition; the thistles and noxious weeds exterminated, and let there be a steady and constant improvement going forward, and we shall be satisfied that

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some little good has been accomplished. And further let us add, that you need not be afraid of agricultural knowledge; read the experiments of others, and think, and so far as they look consistent try them. If any doubt exist, try them on a small scale, but be sure you put your land in proper condition. Make it rich, plow deep, pulverize fine, and then with the blessing of a good season your most sanguine expectations will be realized. And permit us here to urge the propriety of keeping exact accounts of your farming operations; charge all expenses, and credit receipts, and balance the books by profit and loss. You will then have a system to base your future calculations upon, and better calculated to form a correct opinion as to your real interests. (We give the remarks of the committee, as to the farm of Mr. Joseph Watson.)

The first farm examined was Joseph Watson's of Galen, and consists of nearly fifty acres, lying on the south side of Clyde river, and just west of the flourishing village of Clyde. This farm we found (it being the latter part of June) in a very flourishing condition; the crops bid fair for a good yield, the fences good; the thistles and noxious weeds cut, the ditches open, the wet grounds drained, the buildings not costly but comfortable and convenient. The arrangement of the fences (being of various kinds), with the locations of the buildings, the barns and fences, were very good. The stationary horse-power which is attached to the barn, is used for grinding apples for the cider-mill, thrashing and grinding the grain, cutting stalks and straw, sawing wood, slitting boards, &c., &c.. The farm implements were abundant and good, and many of his own construction. The water upon the farm is convenient and plenty.

STATEMENT OF JOSEPH WATSON.

I bought and moved on to the premises in 1834, (autumn) and was occupied away from home until 1839, then commenced my farming on fifty acres of land—less a graveyard, road and river, which leaves me about *forty-five acres*. At this time the only building on the premises was a new frame 16 by 20, for a dwelling, partly enclosed, and but one floor; the fences out of repair, and but little fencing in that condition; and the fields, or that portion which had been cultivated, had been under the plough from twelve to fifteen years, and had the reputation of "*old worn-out land*," on which my first crop of wheat was five bushels, and my first crop of hay one-half a ton to the acre. Clover did not take root, and could not grow; sowed in the spring my first crop of winter wheat. I took off this light crop of hay early, plowed the land deeper than it had been plowed before, cultivated thoroughly and sowed with winter wheat without plowing again, and

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the next spring clover took root well, and gave a good crop, and the wheat compared well with my neighbors; and by similar management, always sowing with small grain, this *worn out land* produces abundantly, and this dry season gave me over 60 bushels of corn per acre. My corn crops are usually from 60 to 80 bushels per acre. Living near the village of Clyde, I tried the experiment of drawing manure from there, but the first experiment of some 50 loads gave me dock and other injurious plants sufficient to require a portion of my time annually since, endeavoring to exterminate them. I, therefore, abandoned the project at once, and am now settled in the opinion that I can steadily improve my soil from its own resources, and at the same time obtain abundant crops. All the manure I can make is put upon the sod in an unfermented state in the spring, and spread no faster than it is plowed under, which prevents it from losing its valuable properties by the effect of open exposure to the passing winds. The depth of plowing is governed by the kind of soil and subsoil of which I have a variety; if light soil and loose or leachy subsoil, I plow only deep enough to obtain sufficient loose dirt, when well harrowed, to make easy planting, and prevent the grass from coming up through between the furrows before the first hoeing. As the soil is more tenacious, so in proportion I plow deeper. This inverted sod is planted with various "*hoed crops*," all of which, except potatoes, are cultivated with *particular* care to keeping the surface of the land *loose and level*—by no means disturbing the sod until the next spring, when it is plowed from one to two inches deeper, than when the manure was covered, which again covers it, (well rooted) within the soil which has been receiving its leachings for the past year, and altogether forms a rich, mellow, deep bed for a spring crop of small grains—and by all means with this crop sow clover seed.

On this preparation, spring wheat has been the best *wheat crop* I have raised, giving in one instance over 24 bushels per acre. I have cultivated a kind of skinless barley, which I have also raised on this preparation, yielding 30 to 45 bushels per acre, weighing 60 to 64 lbs.; harvested in July and ground, makes early and cheap feed, of the best quality, and the young clover makes good feed until September, and is then plowed in and winter wheat sowed, and clover the next spring. I never give the use of my land two years under the naked fallow system, for one *uncertain* winter wheat crop; being a small farmer, I cannot sustain the disadvantages thereof. When I have no barley ground prepared as above, I turn over a meadow and cultivate with harrow and gang plow, and for want of a drill, have put in my wheat on the inverted sod with my gang plow. A meadow which yielded a good crop

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of clover and timothy hay last season, and sown with Mediterranean wheat, yielded this season 24 bushels per acre. I put in a piece the first week in September last, in the same manner, which now looks promising; the exceeding hardness of the ground, in consequence of the drought, caused me to turn my clevis and run my plow the second time in each furrow, to raise sufficient loose dirt to cover the sod completely, which made better work than to have put on sufficient team and turned the whole at once. Thus much to make you acquainted with the kind of cultivation that has reclaimed what was called *worn out* land, and which has brought it to a state of productiveness which will not suffer in comparison with many of the good farms in our county.

On the premises is a peat swamp or marsh, from which I have drawn peat, after having been thrown out of a ditch sufficient time to improve its fertilizing qualities, and spread it around my fruit trees, and trees of the forest set in the street, with very perceptible good effect. In 1835 this marsh was partially covered with water, surrounded with a thick growth of alders, and outside of these alders a black ash swamp, with water upon the surface perpetually. In 1836 I put two ditches (starting from a main ditch I first made up to it through my land lying below it,) up through the timber land each side of the marsh, as far as my line; and every season since have been making my ditch deeper below it, to take the water off, until I am well satisfied, from the additional depth I have given the ditch below, and from the present elevation of the roots of the trees in the black ash swamp above the present surface, that it is near 18 inches lower than when I commenced draining it; and this season, by cutting a ditch across the marsh on the line of my land, from one of the above named two ditches to the other, and taking advantage of the drought in August, I succeeded in plowing it; by letting both horses walk upon the land, and turning my clevis, I did it very nice without difficulty. My first attempt after ditching, was to tear up the large *roots* or *bogs* lying on the surface, with oxen and harrow, but my cattle commenced the "downward march," and to save them I unyoked them, carried the yoke and drag *ashore*, and called the oxen off, and we were glad to come off alive. I then went on, carpenter's adze in hand, pared them even with the surface and piled them up, and in the winter, when the marsh froze, drawed them (120 large sleigh loads) on to my upland, and in the spring plowed them under, thinking that was the end of them; but on plowing the ground the next spring, they came up again, and after tossing them about long enough to pay well for all the fertilizing qualities I *shook* out of them upon the land, I was forced to draw them off and burn them in heaps. So much for want of

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knowing they will *never decay*; and if either of you have any thing of the kind, this will enable you to profit by my experience.

After seeding this marsh again to cover the places where the bogs were cut off, I mowed and pastured it, and could go on with a wagon and get off the hay upon the sward; but the hay was poor and full of wild stuff. Since cutting the cross ditch and plowing this season, I have passed over it with horses and wagon, and shall plant it in the spring and expect a good crop of corn and roots. I have dwelt at length on this marsh, as we have many similar places in our county which should be reclaimed, and which, in my judgment, is to be our most valuable land, besides the peat and marl which will be taken from them to enrich our more elevated lands, and therefore hope you will take the hint from this scrawl, and introduce in your report upon farms something in your own way to awaken an interest in our county to this highly important subject.

In fencing and dividing the premises into fields, their size has been governed by the natural variety of soil, ditches, timber lot, &c., with care that every lot should open into a lane running lengthwise through, near the center of the farm in which is a living spring of pure water, where stock can drink at any and all times they may choose. Most of the fences were made in the usual form of stake and riders, but in from three to five years the stakes would decay at bottom and *cast the riders* to the ground, and in consequence of this trouble and uncertain protection, I adopted a plan of setting two perpendicular stakes on the same side of the fence on top of the ground, when the fence is four or five rails high, and fasten them with a No. 10 wire put around them, confining them snug into the two corners formed by the end of the rails projecting, then continue filling up between these stakes until the fence is eight rails high; the ends of the wire are merely hooked together, which makes, all things considered, the most economical rail fence I have seen; and no cattle, or high winds have disturbed a length of it since made, and most of it is exposed to both. I can plow nearer to it than the cross staked fence, and there is no trouble with the stakes rotting off as they stand on the top of the ground. Around my orchard and garden I have a picket fence of 2 by 4 hemlock rails, 18 feet long, and yellow cedar posts nine feet apart; pickets 5 feet long, 2½ inches wide, which run to the ground, and which is the cheapest and most substantial picket fence I have made. Along the road cedar posts are set 12 feet apart, with three feet pickets, and a board one foot wide at bottom; this costs more, and is not *enough* better to pay the difference. Also, on one side of the road is a common board fence well made, 4½ feet high, with five boards and a cap, some cedar and some oak posts; the latter have been set but six

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years, and I am now being compelled to set occasionally new posts in place of some decayed and broken at top of the ground. The want of proper timber that would be durable when set in the ground has caused me to adopt the plan of making posts of 1¼ inch oak plank, (or thicker of sound hemlock,) 2 inches wide at top and 18 inches wide at bottom, and every post setting on the opposite side of the fence, of the next post, five boards high and a cap, joints broke on every post and a bat 2 inches wide nailed opposite to each post, and through the boards to the posts which are 4 feet high, and all resting on flat stones on top of the ground. To hold this fence from being moved, once in four to six rods are set posts close to the fence, and a board nailed to it, which runs through the fence between the top board and the next below; and on the side of the fence opposite to the post, is another piece of board or plank nailed to the one coming through the fence, long enough to hold the two top boards close to the post, and not nailed to the fence, which allows the frost to raise the fence, which settles back to its place on the frost going out of the ground, and breaks no nails or boards, which would be the case if nailed to the post, as it should be set in the ground deep enough not to be disturbed essentially by the frost. This last fence is, of all others, the best and most *economical* of any fence made of wood, within my knowledge. When these standard posts decay, others can be set in their stead without disturbing the fence, which all stands above ground, and can be nothing short of *very durable.*

My house and other buildings stand fronting south to the road from Clyde to Marengo, &c., from which a lane opposite to that running south through the field, runs past my woodhouse to the barn, from which I pass into and through a wagon house, or through a gate at end of lane into barn yard, which is entirely enclosed, with wagon house, two hay barns and two open sheds, out of which is a passage back to river and springs to water. My barn is a common 30 by 40, 15 feet posts; bay, floor, grain and stable; a leanto 40 by 24 feet, has been attached to the back side in which there is an inclined wheel horse power 22 feet in diameter, with a rope passing around the entire wheel and running to a jack, turning a band wheel to which is attached, as occasion may require, a circle saw, for sawing stove wood, splitting pickets, &c., a grindstone, cider mill, small burr stone grist mill, (stones 20 inches in diamater,) which grinds meal for use of my family or feed for cattle and other stock, thrashing machine, and a *new* seperator of my own construction, corn-sheller and clover mill; requiring according to heft of work, one or two horses without harness, their weight alone doing the work, on a smooth floor to travel upon, inclined two inches to the

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foot. My orchard consists of about sixty bearing apple trees of choice grafted fruit, a number of bearing peach trees, and a young peach orchard beginning to bear fruit, pears, quinces, plums and cherries in abundance for use of the family. In consequence of the unfavorable season, my orchard has yielded less abundant than usual. My garden is made in proportion to domestic requirement, which is small; but a more luxuriant growth of vegetables than it produces annually is seldom seen.

In 1849 I raised from seven acres of meadow, broke up in August, 1848, cultivated on the inverted sod, and put in with a gang plow, 173 bushels of Mediterranean wheat, over 24 bushels per acre, and sold it

at 8s. 6d. per bushel,.....			$183
On hand, used and sold, 67 bushels spring wheat, 8s.,.....			67
On hand and used, 70 bushels barley, 3s.....			21
do	250 do	corn, 4s.,.....	125
do	180 do	potatoes, 3s.,.....	67
do	16 tons of	hay, $6,.....	96
Pasture, pumpkins and stalks, fed to 8 beef cattle, and increased value,.....			85
Butter and milk sold, $50, used in the family, $30,.....			80
Pasture of 4 horses 6 mos. is 24 mo. at 8s. per mo.,.....			24
10 hogs, average over 200 lbs., say 2,000 lbs., at $5, sold part of them at $5, and packed the remainder,.....		$100	
Deduct 100 b. of corn fed, at 4s.,.....		50	
			50
Apples on hand, sold, and cider (over,).....			20
About 2 bush. clover seed not thrashed,.....			8
Raised 3 *extra* calves, 1 pr. matched steers, 1 heifer,....		$25	
Deduct cash paid for the heifer in spring,.....		3	
			22
6 pigs sold and on hand, at 12s.,.....			9
40 chickens, at 1s.,.....			5
Am't,.....			$862
In this amount I made no deduction for 6 hogs on hand in spring, which may have been worth.....		$24	
To offset this I have sold one of them which proved to be a valuable boar, for.....	$12		
And my old boar has *earned*,.....	8		
And his keeping has improved him,.....	4		
			24

Thus you see I have paid cost of hogs in spring.

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The butter used in family is in these items,.....	$30	
Also pasture of the team, 2 horses, 6 mos., ...	12	
Now if you deduct this amount.....	—	42
You then have the sum total,.....		$820

But should you leave the whole sum of $862 and add to that all apples, peaches, pears, quinces, currants, raspberries, strawberries, gooseberries, peas, beans, potatoes, green corn, corn for parching, grapes, beets, turnips, cabbages, onions, eggs, &c., &c., which have all been produced on the farm, some used up, some on hand, some sold, and much *lent* to the needy, all of which we do not count, and which with the honey unsold, would be $38 or more; then we would have the sum of $900 for the whole produce of my little home of 50 acres, (less 5 acres for road, river and unoccupied corner,) leaving 45 acres, which has this season yielded its $20 per acre, including woodland, and as yet unproductive marsh. My help this season was a man at $14 per month, am't $102, and $4 besides in harvest, but my old pine stumps are out, ditches improved and stones picked up, equal to the $102.

WESTCHESTER.

The Annual Fair of the Westchester Agricultural and Horticultural Society, was held in the village of Somers, on the 3d and 4th days of October, 1849. The attendance at the Fair was very large, although the number of cattle and other animals exhibited, were very limited in comparison with some former fairs. The animals, however, were of a very superior description. As is usual with this society, the first day was occupied in the entry and examination of all animals and articles offered for premiums. The second day, by the plowing match, the address and delivery of premiums.

Of grain crops, the samples exhibited were not numerous, although the quality was excellent, and the yield large. In the small fruits and apples there was a great falling off, particularly in the latter, owing to the general failure of the crop. The potatoe crop appears to have suffered less than usual, during the past year.

Our dairymen are turning their attention entirely to the milk business, in consequence of the great demand for Westchester milk in the city of New-York. The exhibition of flowers greatly exceeded that of former years. On the whole, our Society is improving; its usefulness is universally admitted, and our members are increasing.

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Corn.—The following is the description of the manner of cultivation pursued by Henry Keeler, in the raising of corn. About the 1st of May I dug 40 ox team loads of muck, to which I put 60 bushels of fine lime, let it remain in a large pile about two weeks, then carted it in the lot, put it in small heaps; then carted 55 loads of long manure from the barnyard, and plowed it all under. On the 17th of May, plowed on an average of eight inches deep, rolled it down with a heavy roller, furrowed it about two inches deep, 3½ feet apart, scattered 16 loads of manure from the hogpen in the furrows, dropped the corn on the manure. On the 21st of May a part of the lot covered with a hoe, the remainder with a small plow. Expenses of lime, manure, labor and seed-corn $60.21. As soon as the corn was large enough I commenced working it with the horse cultivator, and went through once with a hand-hoe, and thinned out the stalks so as to stand from 8 to 12 inches apart in the drills; went through it five times with horse cultivator. The expense of cultivating and thinning $7.00. The stalks were topped on shares, my portion of them being $3.00. Husking and houseing cost $4.00. In the forepart of the season, a considerable part of the labor was done by the day at $1, and found. I have called the board $2 per week. I have charged nothing for shelling, as it was done at odd times, and I think the cobs will about pay for this. As the season and the land were both very dry, a part of the field was much injured by the drought. As the season has been very dry, and the manure turned under to the depth of ten inches, I am satisfied that not more than one-fourth of the manure has gone to benefit the corn; consequently, three-fourths of it remains for the benefit of the after-crop. Yield 71 bushels 28 qts. per acre.

Officers for 1860.—R. T. Underhill, M. D., President, Croton Point; N. B. Holmes, Treasurer, Tarrytown; R. Bolton, jr., Secretary, Sing-Sing.

R. BOLTON, Jr., *Sec'y.*

WYOMING.

In compliance with the duty devolving upon me by law, I proceed to report, that the most of our lands are adapted to the purposes of grazing, which afford perhaps, the most ample profits, from the amount of capital invested, of almost any other part of the State. There are some exceptions to its being universally a grazing county, which is only a small portion of our territory, lying upon its eastern boundary, 6 or 8 miles in width. This is well adapted to raising grain. We can raise grain

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well, also, upon much of the flat lands adjoining the streams, running through our county. Our last Annual Fair, exhibited as much interest as could be expected by the most ardent friends of agriculture. It was attended by as numerous an assemblage of persons, as ever convened in our county to my knowledge. The productions of the county, generally, were well represented, in a greatly increased amount, from any of our previous fairs; and our show of horses and cattle, one of our most prominent interests, I think was such as ought to entitle us to rank among the first in the State. I can make this report the more freely, when I inform you, that I did not present any of my own. The course pursued at the State Fair, of classing the different breeds of blooded cattle, was adopted for the first time with greatly increased satisfaction, as there are now in this county, several breeders of full blood, both of Devons and Durhams, which have heretofore competed with each other for the same premiums. The former system left the particular friends of each breed to claim their superiority, when in fact, both breeds ought to be equally encouraged at Fairs, until the whole people are willing to give preference to one or the other.

The society was addressed by Levi Gibbs, Esq., of Perry, in this county, in an able, lucid, and interesting manner, receiving the enthusiastic thanks of all present. The various reports of committees, were instructive, minute and pleasing, and would well bear publishing, among which I notice one upon butter, by Arden Woodruff, and Joshua H. Darling, peculiarly calculated to promote the active investigation of the best minds in the State, and from which I quote as follows:

Butter.—The committee deeply regret that on a subject of so much importance to the interests of the great majority of the people of this State, and especially to those of this county, so little attention should be elicited. The dairy business in this State, is becoming one of its most important interests. It is yearly increasing in extent and importance in this county, and as our wild lands shall be improved and cultivated, it is destined to become second in importance to no other branch of industry. It cannot then but be clear to every person on a single moment's reflection, that the manner in which this branch of business is conducted, has a very important bearing upon the interests of the farm, as well as the character and interests of the county. The difference which is now paid for the article of butter, between the dairies of the first character, and a large proportion of the dairies of this State, averages from $6, to $8 per hundred. According to the statistical returns in the census of 1845, there was made in this county the preceding year, 1,191,615 pounds of butter. Your committee presume the increase in the quantity made during the past five years, is such that during the pre-

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sent year, at least 1,000,000 pounds of butter will be sold by the farmers of this county. If this by good management in the manufacture could have been made so as to produce $6 on the hundred more than has been received for it, there would have been a clear gain of $60,000 to the farmers of this connty, in the single article of butter, which surely would be worth putting forth considerable exertion to obtain.

According to the census of '45, there were in this county at that time about 14,000 cows; allowing that they gave milk but six months in a year, which is a very low calculation (deducting 4,000 cows used in the manufacture of cheese) they average per head but a trifle over eight ounces per day. All our farmers know and will acknowledge that a medium cow ought to produce and will, with good management, one pound of butter per day, during the season, or 183 pounds in a year. If, then, there can be $60,000 saved by good management in butter making to the farmers of this county, when but one-half pound of butter per day is made from a cow, there will be, if the cow produce one pound per day, $120,000 clear gain each year by equaling it, as it is made in our best dairies, and $120,000 for extra amount of butter, is $240,000 clear gain in a year to the farmers of this county on the article of butter, which if equally divided among the inhabitants, would give $9 to each man, woman and child in the county; and this rule applied to the State (there being in the State in '45 a trifle short of 1,000,000 cows, producing 79,501,733 pounds of butter) would give on the amount of capital now invested, a clear profit to the dairy interests of this State of $7,155,000, being more gold your committee believe than will be gathered from the mines in California by all the ardent, enthusiastic gold seekers from the empire State for ten years to come. * * * And your committee feel confident that the dairymen of Wyoming county are possessed of that energy of character and determination not to be excelled in their business, especially where their pecuniary interests so loudly demand zeal, care, and activity, and last, not least, a firm conviction that they are possessed of all the means necessary to enable them to compete successfully with Oneida, Broome, Chemung, Herkimer or Orange counties, and that the produce of their dairies will ere long be second to none in the State. * * *

The above is only a portion of said report, which is given, as showing some of the interest manifested in this peculiar and luxurious dependence of our county, and which showed no more in the rank of its importance, than was exhibited on agricultural subjects generally.

The plowing match excited, and justly too, a very great interest in the minds of both plowmen and by-standers. Five competitors entered

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upon a handsome flat of sward land to exhibit their skill, both in holding the plow and managing their teams in this important branch of farming business. At the preceding Fair only three competed for the premiums, who made rather indifferent work, compared with much I had before seen; and when I saw the completion of their respective lands by the five at our last Fair, in as good time, and in a style I had never seen surpassed in this or any other country, eliciting admiration from all present, I remarked my satisfaction, and listened to the most enthusiastic praise from all around me. Had I been the judge to award the premiums, I should have awarded first premiums to each one. The eye could scarcely detect the least deviation from a straight line of the beautiful turned furrows. The whole presented, in a mechanical point of view, a beautiful demonstration of human ingenuity and skill. Good plowing must ever form an important item in our Agriculture, and especially where farmers plow in the spring for their crops, as many do with us. I much prefer fall plowing for this section of country, and that the land should be laid in beds, so as to dry at an early period in spring for the reception of the seed. My experience has convinced me that an addition of nearly twenty-five per cent. on the product may be realized by applying the roller, which prevents the frost from heaving out the roots of grass or grain, and secures a tight, even bottom to work upon. I have made numerous experiments, demonstrating to me these facts in the same field, by rolling one land, leaving one, &c., and I believe them applicable to all lands subject to heave by frost.

A resolution was referred to the executive committee about dispensing with an address at the next Fair and substituting in its place the reports of special committees on the various interests of Agriculture, proving by a fair trial which course would confer most substantial benefits upon our Agricultural interests. Our society had on hand in December, 1848, $148.75, and received from the State $87.00; for memberships, 87.00. The whole amount of premiums awarded at the late Fair was $155.75, of which 149.25 has been paid, and 29.78 for contingent expenses, leaving the balance on hand, $143.76. Thirty volumes of Transactions and premium dictionaries were awarded, of which 26 have been paid.

The following officers were elected for the ensuing year: E. P. Beck, of Sheldon, President; E. Z. Stone, of Warsaw, Recording Secretary; Wm. M. Crozier, of Warsaw, Corresponding Secretary; J. H. Darling, of Warsaw, Treasurer.

EBENEZER P. BECK, *President.*

Sheldon, Feb. 8th, 1850.

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YATES.

The Annual Fair of the Yates County Agricultural Society, was held in the village of Penn Yan, on the fifth and sixth days of October. This exhibition of fruits, vegetables, and mechanical work, was not as good as usual. The drought of the summer affected the fruit and vegetables in the county very much. The samples offered were very good. The quality of the mechanical work was unusually good, but the weather on the second day was very unfavorable to the exhibition of carriages and implements which could not be housed, and of which we would have otherwise had a good show. The matched horses, mares, and colts, in quality and number, exceeded those of previous Fairs; and the working cattle were very fine, but few in number. There were a few good blooded Saxony and Merino sheep, but judging by our exhibitions, there are but a few flocks in the county. Swine of an excellent quality are as rare as ever. We need to make greater efforts in the improvement of our swine and cattle. We ought to have in view, in the improvement of the latter, the stall and the dairy, or, ere we are aware, we shall find ourselves feeding and dairy farmers, without a good breed of cattle to operate with. There is, however, a good deal of the Durham blood in the cattle of the county. I send you herewith the list of premiums awarded. We had no annual address, nor other attractions, yet, much to our gratification, the list of memberships was much larger than usual; the spirit manifested was also much to be commended: a desire to promote the cause of Agriculture, independently of any selfish end or motive.

Our annual meeting was held on the 19th January. We had but one crop presented, whether owing to the drought, or the inattention of members, is not known. The corn crop was undoubtedly poor through the county, yet there were some good yields, at least from 110 to 150 bushels of ears per acre. Where there was thorough cultivation and *subsoiling*, there were the usual crops. Mr. Adam Clark, our President, presented a report of a wheat crop raised by him, from five acres, yielding 43½ bushels per acre, at a cost of 32 cents per bushel, delivered at the mill; which I transmit to you. He also presented a report of an experiment to ascertain the relation of the amount of yield of wheat, to the quantity of seed sown per acre.*

The officers of the society for the ensuing year, are: Charles M. Stark, President; Charles P. Lee, Secretary; F. A. Stebbins, Treasurer.

ARTEMAS BIGELOW, *Secretary.*

* Vide ante pp. 314, 315.

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LEGISLATIVE AGRICULTURAL DISCUSSIONS.

The first meeting in Albany the present winter for the discussion of agricultural subjects, was held at the rooms of the New-York State Agricultural Society, Thursday evening, Feb. 7. Lieut. Governor PATTERSON was called to the chair, and S. HOWARD appointed secretary.

Mr. JOHNSON, Sec'y State Ag. Society, stated that the subject for discussion was *Agricultural Education;* and proceeded to say that it was a matter which was now attracting great attention in all parts of the country. In respect to the prominence of its position before the Legislature and the people of New-York, he thought great credit was due to Gov. FISH, he having been the first, since the great CLINTON, who had occupied the gubernatorial chair, that had evinced a particular interest in recommending appropriations for agricultural affairs. He alluded to the messages of Gov. F., and read an extract from that of 1849, in which the establishment of an agricultural college and experimental farm is recommended. In reference to such an institution, Mr. J. said, the first question was—do farmers need a better system of education than they have had? Every candid man would answer this question in the affirmative. We are far behind some portions of Europe in skilful cultivation; and why? Foreign laborers are not superior to ours, but their labors are directed by men who generally bring more mind to the task—who more thoroughly understand the principles of their business. We want an institution where all these principles shall be taught, and where their practical operation shall be demonstrated. But it might be asked, cannot we learn without this school or farm? To this he would say—the great object is to develope the greatest amount of useful knowledge, and disseminate it among the people. An institution like this would become the Normal School of agriculture, and from it would go forth men, properly grounded in the science and practice of husbandry, whose influence would be felt through all parts of the State. The agricultural interest requires an institution that will secure an education for the farmer equal to that which is conferred by our present colleges and other schools on those who are engaged in any profession. Mr. J. urged that the farmers required

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something as a remuneration for what they had contributed for other interests. The State has expended millions for objects that have not benefited directly the farmer. It had laid out nearly half a million in the departmest of natural history. Now of all this the farmers have not complained; but may they not with propriety ask for an appropriation directly for agricultural education suited to their wants?

Mr. J. alluded to the system of county surveys commenced by the State Agricultural Society, which he was convinced would be beneficial in developing the natural resources of the State. In conclusion, Mr. J. remarked that he thought the time had now arrived for action on this subject. Practical utility is the order of the day. The people are in favor of the principle, and are looking to the present Legislature to second their views in some effectual measure. Not only is this the case with our own citizens, but the eyes of others were turned towards us. In Massachusetts, Rhode Island, New Hampshire, Maine, Illinois, and other States, and even in Canada, the subject is attracting attention, and the Empire State is looked to and expected to take the lead in this, as she had done, and he trusted would continue to do, in other great and important enterprises.

Mr. S. S. RANDALL, of Albany, said his attention had been more particularly called to the subject of agricultural education in connection with common schools. He thought the science of agriculture should take its place with other sciences in those schools; and books containing the elementary principles should be introduced and studied here. It is true that this would not accomplish all that is required; higher institutions are necessary; but the youth should first be prepared for such institutions in the common schools. He admitted that the standard of agricultural education was too low, and the question is—how can it be best raised? Though he (Mr. R.) was in favor of such an institution as had been alluded to, he would first introduce the study of chemistry, geology, mineralogy, &c., into all the schools in the country. He alluded to the agricultural catechism of Prof. JOHNSTON, the study of which would be highly useful to beginners.

Mr. R. spoke of the advantages of a thorough education to the farmer. These advantages were numerous, and even beyond estimation. Knowledge is not only subservient to the farmer, by enabling him to direct all his operations with greater success in a pecuniary view, but it renders all his labors agreeable and pleasant, by making plain to his mind the former mysteries of nature, and enabling him to contemplate the harmonious relation and order of all things.

Mr. CURTIS, of Onondaga, was particularly pleased with the idea of teaching the rudiments of the natural sciences in the common schools.

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He had witnessed a successful example of this kind in his own neigborhood. A female who taught the summer school in his district, encouraged the children to bring in pebbles and specimens of rocks. The teacher, who had devoted considerable attention to Geology and Mineralogy, had these specimens arranged in their proper order, and explained to the pupils their geological relations, and their nature and properties. The pupils became delighted, and spent a portion of their leisure time in collecting specimens, and had acquired such a taste for Geology and Mineralogy, that they would pursue the study of those sciences with energy and interest.

Mr. C. expressed himself as being favorably disposed towards all measures that will promote the agricultural interest. As to the establishment of an Agricultural College and Experimental Farm, it would doubtless be beneficial, if founded on a proper plan, and rightly managed. He was not prepared to speak particularly in reference to the plan which had been reported by the commissioners.

Judge MILLER, of Rochester, said, though he was not himself a farmer, he hoped his *son* would be a farmer. He mentioned this as showing the regard he had for the agricultural interest. It is evident that the people of this State have a deep interest in agricultural education. Nine-tenths of our population are farmers, and will probably continue to be so. An important advantage resulting from the better education of this class, would be the prevention of our most enterprising young men being enticed away from agriculture, to seek business in the cities. A proper system of education would render agriculture popular, and men would not seek other avenues as the best means of attaining honor or wealth. In reference to the first steps of education, he would begin, as had been suggested, with the children in the common schools. Further than this he was not at present prepared to make any particular suggestions; he hoped, however, that we might have an institution for agriculture, which should correspond to the higher institutions for other professions—an institution that shall be creditable to the State of New-York.

Judge M. illustrated the necessity of *practical* knowledge in regard to agriculture and horticulture, by referring to his own experience in the use of guano. When that substance was first introduced, he had heard much of its value as a manure, and as soon as he could obtain some, he applied it to his pet plants; but not knowing how to use it, he killed most of his plants. In the application of facts, we must have the benefit of practice and observation.

There was another way in which Judge M. hoped we should derive great benefit from a more thorough knowledge of agriculture. By

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better cultivation, we shall be enabled to obtain much larger crops, and hence a less extent of land will answer for the same population. This will justify a subdivision of lands into small farms, and we shall thus be enabled to retain a highly useful and large class of citizens, all of whom will be interested in the land, and consequently in the institutions and welfare of the State.

Hon. Mr. BREWER, of Tompkins, was confident that the study of books on agriculture might be introduced into the common schools with advantage. During the first visits of the Superintendent of Schools in the county where he resided, a class was formed for studying a manual on agriculture. (Taylor's.) The class made good progress, and the study was evidently useful. But we needed a higher institution, and it had been a subject of regret to him, that we had not one in the State. He had seen something of the great advantages, which such an institution may confer. He had a son at the school of Agriculture connected with Yale College, under the charge of Prof. NORTON. He had been there a year and a half, spending his vacations at home, on the farm, applying to practice, as much as possible, the knowledge he had acquired; and enough had already been demonstrated in this way, to settle in his mind, the question as to the utility of such an education. In connection with this subject, Mr. B. alluded to the necessity of more correct statistical information in regard to agricultural products than we had yet obtained. He was certain that the last census was very imperfect—the number of acres in the different crops, and their yield having been, in many cases, only *guessed* at.

Hon. S. M. BURROUGHS, of Orleans, was not prepared to speak in detail in reference to the subject under consideration, but would remark, that there were many points of view in which such an institution as is contemplated would be useful. The establishment of a good veterinary school, in connexion with such an institution, would, in a few years, save a greater amount, in the lives of animals, than the whole institution would cost; and yet this was only one of many branches of useful knowledge that would there be taught. He was for using all means that would promote the dissemination of knowledge among farmers. Agricultural papers were important means of this kind. To them was owing much of the interest now manifested in agricultural improvement, and he rejoiced that their circulation was increasing. The Transactions of the State Society, embodied, every year, a vast amount of valuable informatian for the farmer. Farmers also might derive much benefit from conversation with each other, and in this view,

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meetings for the discussion of subjects pertaining to their interest, were productive of good. He hoped all the members of the Legislature would attend these meetings. The subject of the establishment of an Agricultural School and Experimental Farm would soon come before them, and a preliminary discussion here, would enable them to act on it more understandingly. He hoped to hear the views of all in reference to the general subject, and also in reference to a plan and its details.

February 28.

AGRICULTURAL EDUCATION.—*Continued.*

Hon. WILLIAM BUEL, of Rochester, in the Chair.

Hon. F. S. MARTIN, from Cattaraugus county, said he was in favor of any means which would promote knowledge among farmers. He was sorry to say that this class were generally too much under the influence of prejudice, which prevented their giving due attention to the sciences connected with Agriculture, and too frequently led them to stamp every innovation on their established usages with the epithet of "book-farming." He thought the present course of education at our higher institutions, tended to divide the community too much into classes. In the adoption of any new system, he was anxious that these distinctions should, as much as possible, be done away. Farmers should be educated as *gentlemen;* that is, so educated that they may be not only thoroughly acquainted with the principles and practice of their profession, but fitted to occupy any station under the government of the State or nation. As to the project of an Agricultural College, he had not as yet fully considered it, though he was well convinced of the general utility of such an institution, and without giving any opinion as to the details, he heartily wished the enterprise God-speed.

Judge MILLER, of Rochester, said it was somewhat singular that Agriculture, which was in fact the "nursing mother of us all," should be the last interest to receive the protection of government. But he thought the people were now determined that something should be done. The first question is, what is wanted? Let practical farmers answer. All appear to be desirous of adopting some means for the dissemination of knowledge. He took it for granted that it was not the mere *poetry* of Agriculture that would satisfy the farmers; they wanted the profits in the shape of *money.* He trusted that this would be the primary object in the establishment of an Agricultural College and Experimental Farm; and he thought the institution might be advocated on that ground. It was not unreasonable to suppose that we might, by the application of science, add to the annual yield of our grain crops,

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one bushel to the acre; and if only this were done, the increase of wealth would be very great, beyond all proportion to the proposed outlay.

Mr. S. S. RANDALL said the subject under consideration was an important one to the practical farmer. He ventured to speak of its importance in this light, from having himself been practically engaged in farming for the last three years. He was convinced that farmers required a higher grade of education for their own interest. The only question is as to the means of obtaining it. It should, however, be borne in mind, that as a general rule, it is safer to avail ourselves of means already existing than to incur the expense and risk of trying new schemes. We have in the State 15,000 school districts. If the knowledge to be disseminated is placed within the reach of those who attend the common schools, its spread must be vastly more rapid and more effective, than if efforts were only directed to a single institution. In fact he could see no particular advantage of such an institution, unless teachers were there to be educated for the common schools. But the study of Agriculture had already been introduced into the Normal School. In a few years there will undoubtedly be a demand for higher institutions. The farming community were every day becoming more and more convinced of the value of education, and the cause would continue to gain strength.

Hon. Mr. LAWRENCE, from Yates county, admitted the necessity of having the teachers of common schools qualified to instruct in the principles of Agriculture. But he would inquire how the 15,000 teachers, so qualified, could be obtained? These we need and must have. For years, individuals among us have wished to obtain such an education as the institution now under consideration will be calculated to furnish; but as that education could not be had in this country, our citizens were obliged to go to Europe to obtain it. The farmers of the State want an institution where they can send their sons to acquire a better and more useful kind of education than is furnished by any existing institution among us. He was satisfied that such an institution was called for, and that the connection of new professorships with existing colleges or schools, would not answer the purpose. We want a complete, a *model* institution, and he thought it was the duty of this Legislature to establish one.

Hon Mr. ENOS, of Madison county, was in favor of one institution; it would be safer to start with one; if more were needed, it would be easy to make them. He would, in the course of instruction to be pursued, have science and practice go together, so that the pupils shall know how to use the knowledge they acquire. He would have the

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system thorough; he was not in favor of any *half-way* education. Quacks in Agriculture were as useless, if not as dangerous, as quacks in medicine. He hoped particular attention would be given to the management of farm operations in a systematic manner. Our farmers are generally greatly deficient in this respect. He presumed that not one in five hundred can tell what it costs them to raise a bushel of corn; they generally guess at it. They should keep strict accounts, which would be of as much advantage to them as they are to the merchant or manufacturer. He believed the contemplated college and farm would be highly useful, not only useful to the young who should go there as pupils, but to farmers themselves, who would derive many useful ideas from the institution. We may be always learning; and for himself, though he had always been a farmer, he had learned more within the last ten years, that was of practical value to him in conducting his business, than all he knew before.

Judge OSBORN, of Watervliet, said he had modified his views, somewhat, since this subject was discussed here a year ago, and was now satisfied that an institution to teach the sciences connected with agriculture and the arts, would be useful. He would take the system pursued at West Point, in some respects, as his model—an institution which turns out more useful men than any other in the country. To be sure, a great deal of time was spent by the pupils at West Point in learning how they could slay their fellow-men, and how they could avoid being slain; but other things were learned, and those who graduated there make good engineers, presidents of colleges, and statesmen. He would make the *practice* of agriculture, at the institution contemplated, of secondary importance. He did not think it would be practicable to interest students in the manual operations of farming, but they might be interested in the science, and this science they would apply for themselves. They should be taught various sciences, not overlooking meteorology, in which farmers generally were not well informed. They often look into the almanac to see what are the phases and position of the moon, in order to make up their minds what the weather is going to be, or when to kill their pigs, to have the pork good. Farmers labor under many disadvantges in these respects, which a proper education would do away. As to the proposed college, he would have something worthy of the State. The expenditure should be liberal. He would go beyond the amount recommended in the report of the commissioners—would even double the amount. As to buildings, he would have them tasteful and permanent. We should have large views, and if we lay the founda-

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tion properly, and manage judiciously, the institution will attract students from all parts of the country.

Hon. Mr. Cowles, from Onondaga county, said he was a practical farmer, and he thought he could see the necessity of a more thorough education—mental, moral and physical. Farmers need an education which shall liberalize the mind. They are too prone to regard with distrust all innovation. A proper degree of prudence and caution is commendable, but let us be guided by reason. He illustrated the force of prejudice as a barrier to improvement by citing the opposition to the introduction of the cast iron plow, of which many present had a distinct recollection. The unreasonableness of that opposition is now apparent; but still the same obstinate prejudice is manifested in regard to other improvements. But he was happy to believe that a good number of farmers were in favor of some action by the Legislatnre in reference to education, and he hoped something would be done.

Hon. Mr. Holmes, of Brockport, concurred with the ideas which had been expressed in relation to the expediency of establishing an Agricultural College. He hoped practice and science would go together, in the system of education which should be adopted. It might be proper to test the effect of manual labor in connexion with study. The institution at West Point had been alluded to. Was not the success of the student there, owing to their manual exercise? If this should prove to be so, manual labor may be connected with other institutions. He thought public opinion was ripe for this institution, and he was pleased with the measures taken in reference to it.

Mr. Bloss, of Rochester, was not a farmer, for he had no land; but, like Diedrick Knickerbocker, he had become a great admirer of the land that belonged to others. He had no doubt that education, by improving the occupier of the land, would improve the land. A striking characteristic of the present age is, that knowledge is becoming more generally diffused. Formerly it was locked up, and accessible only to a favored few. This cannot be so any longer. The people claim that *all* have a *right* to be educated. There are various ways of obtaining knowledge. An important one is reading. This is, perhaps, of more advantage than any other. As to the two modes which had been suggested of teaching the principles of Agriculture—the establishment of a new institution, or the connexion of new professorships with our present colleges—both might do good. The question is, which is best? He thought an objection to the connexion of professorships with existing colleges would be, that Agriculture would not have a sufficiently prominent position, and the system of instruction would be likely to be less perfect, than at an institution where

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it was the primary object. He rejoiced at all the means which were being used for the improvement of Agriculture; he would not relinquish any of them. He would ask the aid of the Legislature, and if all that was asked was not granted, he would take what he could get. He would be glad to see such an institution as had been spoken of. Jealousies might arise as to its location, but wherever planted it would do good.

Mr. McADAM, of New-York, said he could lay no claim to the title of farmer, as he belonged to the legal profession. He did not agree to the position which had been taken, that a special institution was wanted for the agricultural interest. The colleges already existing teach the sciences which have been named. Can they be taught better in an Agricultural College? If the farmers have a college for themselves, it will excite the opposition of the mechanics. He did not think it was true, that Agriculture had not been benefited by our present colleges. He had traveled much among farmers, and found that almost every family had sent a son to some literary institution, to receive an education. Could it be said that this was no benefit to farmers? He admitted the importance of Agriculture. There was no class which deserved to stand so high as the farmers, because they produced the sustenance of all; but in the establishment of institutions for education, the greatest good of the greatest number should be consulted.

Mr. CURTIS was sorry to see any evidence of jealousy. Farmers only asked what other professions had—an institution adapted to their wants. He hoped it would be granted.

Judge MILLER said he was mortified at one suggestion which had been made, in relation to the style and expense of the buildings for the proposed institution. The idea that we should imitate the expensive State buildings—one of which cost nearly half a million of dollars, should not be tolerated for a moment. We want none such, and the temper of the people is opposed to such useless extravagance. No, let us keep near the ground, and then if we fall we shall not be much hurt. But, if we act with proper judgment, we shall not fall.

Mr. BREWER cited the success of the departments of Yale and Harvard Colleges, where agricultural science is taught, as evidence of the expediency of establishing an Agricultural College in this State. He thought our own citizens ought not to be under the necessity of going out of the State for this kind of knowledge.

Mr. MILNER, of Rochester, was much pleased with most of the suggestions which had been made. He liked the proposition for an Agricultural College. Such an institution was much needed, and he thought

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the people were ready for something of the kind. He hoped this Legislature would not rise without passing a bill for this object.

The chairman, Judge BUEL, remarked that he was pleased to hear from *every* farmer who had spoken, that he was in favor of the proposed college. Such he believed was the feeling of every intelligent farmer in the State.

At the close of the discussion, the following resolutions, substantially those adopted by the Agricultural Society of Onondaga county, were read by Mr. JOHNSON, and were unanimously adopted, Mr. RANDALL seconding them:

Resolved, That this meeting cordially approve of the plan proposed by the commissioners appointed by the Governor, believing, that the establishment of such an institution would not only tend to the advancement of the science of agriculture generally and to the more rapid development of the resources of the State, but also that its benefits would extend directly or indirectly, to all classes in the community.

Resolved, That in our opinion it would be advisable to afford to the pupils in such institution the facilities for gaining a practical knowledge of the principles of mechanics, engineering, architecture, surveying, &c., in common with the studies proposed, by providing suitable apparatus, teachers, &c.

We give the following very appropriate suggestions from MYRON ADAMS, a farmer, of East Broomfield: "It may be expected that farmers will express themselves on the subject, and upon them should devolve the perfecting the details of a plan by which the mass of farmers may be benefited by the endowment of such an institution. Let the common farmer, the man who owns from 100 to 150 acres, feel that this is for the education of *his* sons, that he may be disposed to finish their education, which has been going on in its primary branches under his own eye, by sending them to this institution, and let their sons feel that to go through a course of studies at this institution will be a better portion with which to commence the *great struggle* of life, than a portion of the *home* farm, or $200 or $300 in cash. Agricultural societies and agricultural newspapers have done much to arouse the mind to thought and reflection, and great advances have been made towards good husbandry. They have been pioneers in preparing the way for still greater improvements. We have been led by them to derive more light and still further application of science to the developing of our resources. But my particular object in writing is to hold up the idea prominently that this institution should be mainly for the education of the humble farmer, for the sons of him who feels unable to defray the

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expense of an ordinary collegiate course. It should counteract the prevailing notion that if a young man would rise to office and honorable stations among men, he must become a lawyer or a merchant—it should attract them to the pursuit of agriculture as the most certain way of securing a competency, and of elevating them above the fluctuations of commercial life. The sons of the wealthy should of course have the benefits of the institution, but they may not always be prepared to submit to the spending of a portion of each day in manual labor—without which no one can become expert in the use of all agricultural implements and an adept in all the duties of the farm. The enthusiasm with which many young men look upon the life of a farmer is very apt to *ooze out at the ends of the fingers*, when swinging the scythe or cradle under the scorching rays of a noon day's sun. If stern necessity has not in their boyhood taught them to stand at their posts both in sunshine and shade, they will be very apt to dispense with the practical part of every unpleasant duty, and prefer shade to sunshine when making hay."

Thursday Evening, March 7, 1850.

FRUITS AND FRUIT CULTURE.

Hon. Mr. HAIGHT, of the Assembly, in the chair.

Mr. JOHNSON stated that he had received from Mr. James Lennon, of Rochester, (through Mr. J. H. Watts,) a parcel of Isabella grapes, to be distributed among gentlemen present at this meeting. These grapes were represented to have been packed about the 15th of October last, in saw dust from a wood turner's shop, They were gathered and packed in barrels on the same day, and were then placed in a cool room, where they would not freeze. They kept well and are now selling at Rochester for twelve and a half cents per pound. They were pronounced of fine quality by all who tasted them.

Prof. HALL gave a history of a seedling apple called the "*Slingerland Pippin*," specimens of which were presented by him for examination. This apple was produced from the seed of the Newtown Pippin. The original trees are on the farm of the late Mr. Slingerland, of New Scotland, Albany county. About twenty years ago, the seeds, which had been saved from a barrel of Newtown Pippins, were planted. They produced many trees, three of which bore fruit of the same kind. The fruit produced by most of the other trees was nearly worthless. These apples resemble, in their exterior appearance, the parent variety; but the flesh is more tender, juicy, and of more sprightly flavor. The trees are said to bear much better than the Newtown Pippin,

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and to bear regularly every year. The seedling comes into eating in November, and keeps till April. It was unanimously pronounced an apple of the first quality for the season.

Prof. EMMONS, being questioned in reference to the theory of the "running out of varieties," said he knew of no principle of vegetable physiology which supported such a theory. He was aware that it had been advocated by KNIGHT and others, but he could see no reason why the scion or bud might not be propagated indefinitely. Individual *trees* have their age, undoubtedly, though their period of life varies with circumstances attending their location—as the adaptation of the soil, climate, &c.

Judge MILLER, of the Senate, had understood that old varieties of grapes produced less seeds than new ones; that the seeds diminish as the varieties increase in age. He practices letting grape vines grow from seed. He had raised many in this way, some of which had borne fruit, and he should continue the practice, in the hope of obtaining valuable native varieties. The Grey Tokay and Miller's Burgundy grow well in his garden at Rochester, and the latter will survive the winter without covering, but the frost injures the buds so that it does not produce half so much fruit as when it is slightly covered. He raises peaches, also, from seed; has a seedling Melocoton, which he prizes highly. He was in favor of giving grapes a strong root, as this increases their productiveness. The roots can be made as long as may be desired, by simply burying the vine a little below the surface of the ground; it will strike root at every joint.

He had made some experiments to ascertain how grapes would do without pruning. A vine of the Lenoir variety, and which had a very strong root, and vigorous habit, was allowed to run over the top of a peach tree, and it produced so much fruit, that it broke the tree down. He had great hopes that hardy grape vines which grow on trees would do well without pruning. He thought the best mode of preserving grapes was to pack them in cork dust. If the dust is not perfectly dry, it should be kiln-dried, and the grapes should be dry when packed; if any burst their skins, they should be thrown away. He has had grapes keep all winter by spreading them on a garret floor, and covering them with "comforters." Cotton batting would probably do as well, but it is not as convenient to handle.

Judge M. related his experience in the use of salt around plum trees. His object was to prevent the destruction of the fruit by the curculio. It had not much effect in this respect, but he had a great crop of plums, though this fruit generally failed that season. He thought the salt was the chief cause of the unusual product.

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Mr. CURTIS related his experience in grafting grape vines, in which he had been very successful. He grafts the Isabella on roots of the wild varieties. It is done in the common mode of cleft or "split" grafting. The roots are set in the ground so as to have the junction of the scion with the root fairly below the surface. They grow well, some have borne the same season they were grafted. He takes pieces of roots fifteen to eighteen inches long.

Mr. JOHNSON read an extract from the statement of Mr. Poppe, in regard to his vineyard near Syracuse. Mr. P. attributes mildew to dust settling on the grape, which holds moisture from dews or rain. He recommends that hoeing round the vines in dry weather should be avoided, as it rises dust. Ante, p. 121.

Mr. J. also read an extract from the report of the Wayne County Agricultural Society, from which it appeared that the quantity of dried fruit exported from Lyons and Palmyra last year, was more than 30,000 bushels; that from Palmyra alone, there is annually exported about 60,000 barrels of fine apples; and estimating that Lyons, Newark and Clyde together, send off as much more, (which it is thought they do,) the aggregate amount of green and dried fruit sent from the county annually, is 400,000 to 500,000 bushels. This one example may serve to indicate the great importance of fruit in a commercial view.

Mr. MARKS, of Durham, Greene county, did not think dust was the cause of mildew in grapes. He has a grape vine which stands near a very dusty road, but it always bears well. He propagates grapes by layers; sometimes get them to bear the first year; will bear two or three years sooner than by cuttings. He cultivates several kinds of grapes. Had tried the White Sweet Water, but it mildewed badly; the Catawba and Isabella do not mildew. He had kept Isabella grapes in kiln-dried hemlock saw-dust till April, and they came out well. They were kept in a cool room where there was no frost. The past year, he used mahogany saw-dust. Pine saw-dust does not answer; the grapes will taste of it. Has found the Catawba grape keep best when picked just before it is dead ripe. Has had the Isabella and Catawba bear well when not laid down. Usually trims vines from December to February—leaves three buds of the new growth; there is not much danger of trimming too much, if it is done before the leaves come out, as it always should be; because, if done afterwards, the vines are injured by bleeding.

Mr. M. said that Mr. James Powers, of Catskill, had been engaged in the grape culture to some extent for nine years. He raises several hundred bushels annually. The Catawba is the principal variety. The

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vines are preserved from drought by spreading coarse grass two or three inches thick, over the ground around them.

Mr. M. observed that his place was at the foot of the Catskill mountains. The climate is what would be thought severe for tender fruits; mercury sometimes sinks to 16° below zero. He had found no difficulty in raising apples of fine quality. The Spitzenburgh thrives very well in his grounds. Twelve years since he commenced the cultivation of peaches. Has always had an abundance of this fruit, except in 1848. That year the fruit-buds were destroyed by the previous winter or fall. He attributes his success in the production of peaches, to his somewhat peculiar management. After the ground is firmly frozen in the fall, he puts litter round the trees, four to six inches thick, and treads it down hard. This prevents the buds from starting prematurely. The trees are not so much affected by sudden changes of weather during the winter and early spring, as the covering keeps the roots enveloped in frost, and they remain so till the season is so far advanced, that no frost occurs after the fruit buds start.

In obtaining trees for a northern location, Mr. M. thought it best to take such as were raised in a similar climate. In his own experience, he had been much more successful with trees raised near his own place, than with those brought from Long Island.

Tuesday Evening, March 14.

WHEAT CULTURE.

S. S. Randall, Esq., in the Chair.

Hon. Mr. Brewer, of Tompkins county, had cultivated wheat for more than twenty years, and would give some of the results of his experience. A part of his farm, which in 1830, was an open common, has been wholly devoted to wheat and clover since that time—having produced thirteen crops of wheat and eight of clover. The soil is rather a gravelly loam. His farm is on one of the hills, towards the head of Cayuga Lake, which it is said were burned over by the Indians every year. He had made various experiments in plowing at different depths, from three to seven inches, and has always had the best crops where the furrows have been the shallowest. Usually plows but once for wheat; has sometimes plowed in May, but had no better crop than when he plowed in September, just before sowing. The yields he had obtained were from sixteen to twenty-six bushels per acre. On new land, stiff soils for instance, it might be necessary to plow more than once for a wheat crop, and in such cases, it might be better to plow deep the first time.

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Mr. B. stated that he had made some trials with various quantities of seed per acre, as 1½, 1¾, 2, and 2½ bushels, and had usually got the best returns from the latter quantity; that is, 2½ bushels of seed had given from 2 to 3 bushels more yield per acre than 2 bushels of seed, and 6 bushels more than 1½ bushels seed. Had not been plagued with rust but once in twenty years; was seldom annoyed with the Hessian fly, or with the Wheat midge, but the wheat has often been much injured by these insects in vallies, when it was not noticed on the hills. Has commenced sowing wheat in drills; sowed a part of his crop in this way last fall; the drilled portion looked much the best at the setting in of winter. Saw two fields of wheat last year, adjoining each other, on one of which the seed was drilled in, and on the other sowed broadcast; the drilled yielded much the best; drilled wheat stands the winter best; the small ridges between the rows are constantly working down, and keep the roots of the wheat covered.

Mr. B. spoke of the Etrurian wheat, which had lately been introduced, and had so far done well; it weighed 64 lbs. to the bushel.

Hon. Mr. LAWRENCE, of Yates, differed from the preceding speaker in regard to the proper depth of plowing. The remarks in favor of shallow plowing, seemed strange to his ear. The farmers of Yates *improve* their land by deep plowing. The farm which he occupied had been rented for many years previously to its coming into his possession, and had been plowed about four inches deep, and produced 12 to 15 bushels of wheat per acre. He at once plowed it six to seven inches deep, and raised the first season 30 bushels of wheat to the acre. It was the general expression in his county, that deep tillage was the best for all crops.

He had tried subsoiling; first plowed with a common plow seven inches, then run the subsoil plow the same depth; cross-plowed before sowing the wheat; has invariably had the best crops where he has subsoiled; has subsoiled a portion of a field and left the remainder plowed only in the ordinary way, and the yield is always in favor of the subsoiled part. His is a strong limestone soil, and he intends to subsoil his whole farm, being satisfied that it will pay. He makes a great use of clover as a fertilizer, and uses plaster to benefit the clover; never could perceive that plaster benefited the wheat much, but it greatly increases the growth of clover. He attributes the improvement of the soil by clover mostly to the roots; they penetrate the earth to the depth of 2 to 2½ feet, and raise the soluble substances on which the plant feeds, to the surface, where, by decomposition, they supply food to the wheat crop.

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Mr. L. said wheat was formerly raised in Yates county chiefly on fallows; but latterly, the more common course is to take first corn, then barley, then wheat, the corn being generally manured; but it must be remembered that this cannot be done on a poor soil. He had tried wheat after various kinds of grain, but it does best after barley. The system of drilling wheat is beginning to be practised in Yates county, and Mr. L. concurred with what had been before said in regard to the advantages of this mode of sowing. Palmer's is the kind of drill most in use in his neighborhood, and it gives good satisfaction. The quantity of seed sown can be regulated to a quart to the acre. It covers the seed 1½ to 2 inches deep. The rows are 9 inches apart. The cost of the machine is $55. The best varieties of wheat in Yates county, are the Hutchinson, Soule's and Flint. Many preferred the Hutchinson on account of its earliness and freedom from rust. It would ripen two weeks earlier than the red chaff. Mr. L. thought they raised as good crops of wheat in Yates as in any county in the State. He had himself raised 44 bush. per acre on 16 acres, in 1846.

Lieut. Gov. PATTERSON said his experience was in favor of deep plowing. The wheat lands in the Genesee valley, when new, produced about 15 bushels of wheat per acre. They were plowed shallow; the farmers generally, had not then sufficient strength of team to plow deep; now they plow much deeper than formerly, and obtain from 25 to 30 bushels per acre. In Livingston county, 35 bushels per acre were obtained on some farms. Some farmers there now plow ten inches deep. Deep tillage has many advantages; an important one is, that it enables crops to stand drought. As to varieties of wheat, the old red chaff bald had done best with him, and he had tried many kinds. The Soule's variety had done better than the Flint; but two crops of the ·: 1 are better than three of the Flint. The Blue-stem is being introduced and meets with favor. The proper time to sow wheat in the Genesee valley, is from the 15th to 25th of September. If sown earlier than this, it is very liable to be injured by the Hessian fly. As to the quantity of seed per acre, he thought a bushel and a half, if thrashed with a flail or trodden out by horses, was about right; if the seed was thrashed with a machine, two bushels per acre was necessary. The difference was owing to the wheat being broken in passing through a machine, so that many of the grains would not germinate. In regard to summer-fallowing, he had had better success with wheat on ground so prepared than in any other way, and thought he could raise wheat in that way, cheaper than he could raise corn or oats. As a crop to pre-

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sede wheat, he considers peas preferable to barley or any kind of grain, or any crop, except flax. The cheapest manure for wheat is clover, though he would use all the manure from the barn yard; considers a good crop of clover equal to twenty loads of ordinary yard manure per acre. His practice is to sow six to eight pounds of clover seed per acre; seed costs about ten cents per pound; in spring sows 100 pounds plaster per acre; pastures the clover till latter part of May and plows it under in June; could never see that plaster benefited the wheat, but it makes the clover, and the clover makes the wheat. He is much in favor of the system of drilling in wheat. Wheat put in by this method is less likely to be winter killed. The roots of grain that is sown broadcast, are often injured by the earth being blown off from them; by the drill system this is prevented; the earth which forms the ridges between the rows being blown over the wheat, keeping the roots covered. His wheat crops have sometimes been 40 bushels per acre; has raised 30 bushels per acre on 60 acres.

Hon. Mr. COWLES, of Onondaga, said there was great variety of soil in that county; that on which oak and chestnut constituted the chief timber growth, was best for wheat; but 30 years ago this kind of land was generally thought good for nothing. When it was first tilled, it was plowed about four inches deep, and it did not produce very well; now it is plowed from seven to ten inches deep, and the crops are good, and the land is growing better. On this kind of land, plaster benefits all crops; but on some other soils plaster has no apparent effect. On the chestnut and oak lands, the best crops of wheat are obtained by sowing about the first of September. He had noticed the effect of different crops on wheat. A field was sown as follows:—one-third with peas, one-third with barley, one-third with oats; the next crop was wheat; it was best after the peas, next best after barley, and poorest after oats. So far as his observation had gone, wheat was generally poorer after oats than after any other crop. On his land, wheat was generally best after a summer fallow. As to varieties, the old fashioned Flint was best; the Canada Flint next best. He related an experiment: a neighbor of his took some winter wheat, a white variety; put it into tubs, wet it, and left it to freeze, it being in the winter season. It remained frozen till spring, when it was sown; the produce was a *red spring* wheat, which had been continued in his neighborhood till this day. This experiment convinced him that all wheat was of one species, and that varieties might be originated by causes unusually affecting the germ or the plant.

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Lieut. Gov. PATTERSON had no reason to doubt the result of the experiment just cited; it brought to his mind the long contested point of the transmutation of wheat into chess. He had known chess produced under circumstances which seemed to favor that hypothesis. He knew a piece of new land, just cleared from the forest, at a considerable distance from any other cleared land, sown to wheat, and on a swale in the middle of the piece, there was scarcely any thing grown but chess.

Mr. LAWRENCE said he could not believe that a grain of wheat ever produced chess. All the cases of supposed transmutation that he had ever heard of, could be explained without resorting to such an unnatural idea. It was sometimes said that *clean* wheat was sown, and it produced chess. He had often examined wheat that was called clean, and found chess enough among it to produce all that was grown among the wheat. In wet places the wheat would die out, but the chess would grow all the better, and people were astonished at the quantity.

Mr.—— (whose name the reporter did not learn) made some remarks in regard to smut. He had sown a piece of ground with seed wheat that was a little smutty, but scarcely enough to be noticed; did not apply lime, or anything to prevent smut, and the crop was two-thirds smut. His son sowed some of the same seed, prepared by soaking in brine, and then limed, and the crop had hardly any smut in it. He inquired whether this accorded with general experience. Several gentleman replied that they had never been troubled with smut when the seed was treated with lime, alkali or vitriol.

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PRIZE ESSAY.

ELEMENTS OF SCIENTIFIC AGRICULTURE.

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[Premium One Hundred Dollars.]

INTRODUCTION—ORGANIC ELEMENTS OF PLANTS.

DEFINITION OF AGRICULTURE.

Agriculture, according to the usually accepted meaning of the word, signifies the art of cultivating the soil. It is unnecessary to say that this is its true meaning, and yet how few of those who would promptly give the above definition seem to have any adequate idea of all that is involved in the words "cultivating the soil."

A soil that is *cultivated*, is thoroughly and more or less deeply plowed according to the situation, is mellow, is free from stumps and large stones, is dry and clear of hurtful weeds. How many fields in this condition are to be seen in most American villages? Are they in the majority, or do they constitute a very small minority? It is to be feared that there are few *neighborhoods*, even of limited extent, fitted to challenge inspection.

How frequently and how largely do weeds, bushes, brambles, uneven surfaces, unsightly stumps, and stones scarred with many a mark of plow and harrow teeth, enter into the composition of our rural scenery; and this not in new settlements alone, but in older and long inhabited districts!

Even if we suppose that we have our farm thoroughly cultivated in the manner first described, is it sufficient? No, the *art* of cultivating the soil involves something beyond this. The thoroughly accomplished

*Vide report of committee, ante p. 294.

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farmer must study the nature of various crops, until he finds those which are best suited to his land; if these are not such as pay him best, he must seek to bring about some change by means of which he can profitably grow those that will. This done, he must set himself to increase the quantity grown per acre, for on this increase depends his profit. It costs little more to cultivate the ground for a crop of 30 bushels, than for one of 10 bushels.

The main end seems to be, in numerous cases, to obtain indeed a great yield of valuable produce, but with the least possible investment of money. Many, too many farmers go entirely upon this principle; they ought, however, to think farther, and then they would see that there is another point worthy of consideration. That point is, the keeping of the land in good condition. Cheapness in obtaining a present crop is not every thing; the prudent man will have an eye to the future; he will see that if he always takes away without adding, the richest land must ultimately become poor, or at least greatly reduced in value.

The man who does this is like that one in the old fable who killed the goose that laid him daily a golden egg. He thought that there must be many eggs within the goose, but there was of course only one; and he found, when it was too late, that he had destroyed the source of his riches in a most foolish and shortsighted manner. So will it always be with the farmer who pursues a like system. Tempted by the idea of obtaining a few crops with little expense now, he ruins his land for the future.

The good farmer, then, desires to grow large crops with the least necessary cost, but at the same time never forgets that it is the best economy to keep his land in good condition, and even improving. In order to accomplish this, he must do something more than merely plow and harrow, sow, plant and reap; he must think and study also. *a.* He must learn the nature of the various crops he raises or wishes to raise: these crops differ; he should seek to understand the differences, and how they are caused. *b.* One field he will find to vary much in its nature from another; a certain crop grows here, and fails there; are these things accidental, or can he discover the reasons? *c.* In adding certain substances, called manures, to the soil, he finds diverse effects, not only in their application to different fields, but also to different crops: here is another subject for study. *d.* His animals thrive on some kinds of food, and derive little benefit from others. A small bulk of some varieties sustains and increases their size or strength, while

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upon great quantities of other varieties they grow poor. What are the properties upon which these effects depend?

Thus we perceive that the farmer who really wishes to understand the "*art of cultivating the soil*," must go a long way beyond plowing. He must, it is true, know how to get his soil into a good state; but he must also know something as to the nature of his crops, of the various soils on which they grow, of the manures which are applied to increase that growth, and of the food which he supplies to his animals.

This, it may be said, involves too much study for a practical working man. I reply, that it is not necessary for him to learn the minute details of scientific researches and discoveries. It is enough to begin with the leading principles that have been established; with these he will be able to work more intelligently than ever before, and to go on continually adding to his knowledge.

PLANTS DIVIDED INTO AN ORGANIC AND AN INORGANIC PART.

In endeavoring to explain, in a simple manner, something of this desirable branch of knowledge, we will commence with the plant, and give in a clear, connected shape the information that has been collected by the most approved writers and experimenters concerning it. Hard words and obscure phrases will be avoided whenever it is possible.

We commence our examination with some inquiry into the nature of the materials which compose all of our crops. The first result arrived at is the existence of two grand classes of bodies, to one of which, or to a mixture of both, belongs every part of the plant.

In connection with this fact, there is one peculiarity in all vegetable substances, that early attracts our attention. Whether we take the hard wood, the soft, flexible straw, the leaf, or the root, we find that all are more or less combustible. When dry they generally burn readily, and with a flame, but we see at the same time that *all* does not disappear: the stalk of straw, or the piece of wood, for the most part burns away; but after the flame has gone out, there is always an ash left.

Thus we establish a grand division: one part burns and disappears; another part is incombustible, and remains. Chemists have named the part that burns away, *organic matter;* and the part that remains, or the ash, *inorganic matter*. Fire, then, is one test, by means of which we distinguish organic from inorganic substances. To the first of these two classes we will now attend.

The name *organic* is given, because organic bodies, being products of life, have an organized structure that cannot be produced by artificial

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means. What is meant by an organized structure may be seen by examining a cross section from the stem of a tree: this will be found to consist of little tubes and cells, all arranged in a regular manner. Under the microscope, a potato will appear made up of cells having grains of starch contained.

So with other plants or parts of plants, they all have an organization that is a product of life, and which we therefore cannot imitate. Inorganic bodies have no such structure, and can in many cases be produced by chemical process.

ORGANIC ELEMENTS OF PLANTS.

The organic part in plants is by far the largest, as is plainly to be seen on burning any form of vegetable matter. It ordinarily constitutes from 90 to 97 lbs. in every hundred.

During the burning, this solid organic matter disappears; it is driven off into the atmosphere, until nothing but a little ash remains; that which has gone, then, has evidently become air. It is easy to see that this part of the plant can only have been formed from air at first. Such a conclusion may seem very strange at first, but a little reflection will show that we can arrive at no other. When we have made up our minds to this, it becomes important to know what kind of air it is that forms so large a part of our plants, or if there is more than one kind.

These points have been determined through the assistance of certain chemical experiments, by means of which it has been proved that the organic part of plants consists of four substances.

Their names are Carbon, Oxygen, Nitrogen and Hydrogen.

The whole of the organic part of vegetables and plants, the whole of the atmosphere, all water, and a very large part of the solid rocks which make up this globe, consist of one, two, three, or all of these four substances united in different proportions. These names then stand for bodies of immense importance; and it is very necessary that every farmer should at least know something about them. The three last, oxygen, hydrogen and nitrogen, we find in their pure state as gases: *gas* is the chemical term for the different kinds of air. The other substance, carbon, is found in nature as a solid, and to this we will first direct our attention.

Carbon is a solid, usually of a black color, and having no taste or smell. All the varieties of carbon burn more or less freely in the air, and, while burning, are converted into a gas called *carbonic acid gas:* this will by-and-by be described.

One very abundant form of carbon is common charcoal; another is lampblack; others are coke and blacklead; the most beautiful form is

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the diamond. This, strange to say, though it looks so pure, clear and beautiful, and bears so high a price, does not differ at all in its composition from common charcoal! A diamond can easily be burned by a high heat, and the product of the burning will be carbonic acid gas, just as when charcoal is burned. Charcoal seems to be soft; but if the fine powder in small quantity be rubbed between plates of glass, it is fouud that the little particles are very hard, and able to scratch the glass almost as easily as the diamond itself.

Charcoal has strong disinfecting properties: liquids that are quite offensive in smell, when filtered through it, become pure and sweet. The color is also extracted from many liquids by it. Some of these effects are owing to its power of absorbing gaseous and other substances, itself being full of pores.

Both the flame that we see in wood, and the bright glow of coal fires are owing to the burning of carbon; the flames of candles, of oil lamps, of ordinary coal gas, are all colored by the combustion of this substance. It will soon be seen that it constitutes a very large proportion in the organic part of all vegetables and trees.

Hydrogen, as I have said, is a gas or kind of air. It is transparent, tasteless, colorless and inodorous. As we can not smell, taste or see it, we can only judge of its properties by its action with other bodies. For this purpose it is obtained by putting pieces of zinc or iron filings into water, and then adding sulphuric acid, that is the common oil of vitriol. About a third as much acid as water should be used. The mixture will soon grow warm, and hydrogen gas will at once commence rising to the surface in little bubbles.

a. If a glass be laid upon the top of the tumbler containing the mixture, so as to prevent the too rapid escape of the gas, the tumbler will in a few moments become so filled that the gas will burn when a flame is brought into contact with it.

Fig. 1.

b. By far the most satisfactory method is to conduct the operation as represented in fig. 1. In the bottle are placed the sulphuric acid, zinc, and water. The mouth of the bottle is stopped tightly by a cork, through which passes one end of the tube, *a* (this may be of glass or tin); the other end passes water in the cistern *b*, its course being marked by the dotted line *c* (this may be a common pail, or shallow water tub). A tumbler or other convenient vessel is now filled with water, and inverted under the surface, so that it may contain no air, being filled entirely with water: it is then brought carefully over the ori-

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fice of the tube, and the ascending bubbles of gas displace the water until it is entirely driven out, the gas remaining confined. If a little shelf, hollowed somewhat underneath, and with a hole through it at the highest point of the hollow, be placed in the cistern, three or four vessels in succession may be filled over this hole and set aside for use, keeping the mouths always under water. A common tub of a shallow form will answer the purpose of a cistern.

I have been thus particular in describing this little apparatus of the cistern, because all of the other gases concerning which we are to study may be received in the same way. It is perfectly effective, yet at the same time simple and cheap.

The hydrogen being thus collected, we are next to ascertain what are its properties.

1. It is inflammable: if a lighted taper be plunged into a jar of it, the gas will instantly take fire, and burn with a pale flame. This may also be shown by removing the cork from the bottle *a* in fig. 1, and substituting another cork with a short tube coming to a point as fig. 2. A match will kindle the jet of gas issuing from the orifice *a*, and it will continue to burn so long as the generation of gas within the bottle is active.

Fig. 2.

2. Although inflammable itself, it is not a supporter of combustion. The taper which kindles a jar of it, is itself extinguished.

3. It is much lighter than common air, being the lightest of known bodies. This can be shown by turning the mouth of a jar filled with it suddenly upward, and at the same moment applying a taper. There will be a slight explosion, and a body of flame rising from the jar. On the other hand, if the jar be gently lifted and the flame applied beneath, the burning will be inside of the jar, and quite gradual. This property may also be shown by filling a bladder with the gas, and allowing it to rise. It is often used for filling balloons, its lightness giving them very great buoyancy.

4. Mixed with common air, this gas is dangerously explosive. The first portions which pass over from the bottle are therefore to be rejected; and a *match ought never to be applied* to a jar or bottle containing it, or in which it is being made, *without having first tested* the purity of a small quantity collected in a little tube. If this burns quietly when a taper is placed beneath its mouth, the gas is sufficiently pure to use with safety.

5. This gas can be breathed without very injurious effects, but it will

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not sustain life. In an atmosphere of pure hydrogen, every animal would soon die.

The next of these three gases is one of exceeding importance; its name is oxygen. It is colorless, tasteless and inodorous, like hydrogen, that is, when pure: as ordinarily made, it has some impurities. The easiest way of preparing it is to mingle some chlorate of potash with a small portion of the black oxide of manganese. Both of these substances can be procured at the shops in our cities and large towns. Half a teacupful of the mixture will produce quite enough gas for ordinary experimental purposes. The chlorate of potash should be powdered and dried, before mixing with the manganese. When all is ready, the mixture is to be put into a flask with a thin bottom, like those often used for holding sweet oil, and called Florence flasks. These will bear the heat of a lamp gradually applied, without breaking. Flasks of this kind, made expressly for such purposes, are now to be obtained in many places. When the mixture is introduced, a cork with a bent tube should be fitted in, and the gas collected over water in a cistern as before. The heat requires to be continued for some time, before the oxygen will begin to come off with much rapidity.

Having collected a sufficient quantity, the qualities mentioned above will first become obvious. It will then be seen,

2. That on applying a lighted taper, the gas does not inflame as did the hydrogen, nor is the taper extinguished; on the contrary, it burns with greatly increased and extreme brilliancy: it may be blown out, and relighted by immersion in this gas, so long as the least particle of coal remains upon it. So intense is its action as a supporter of combustion, that many substances ordinarily incombustible take fire in it, and burn with great splendor. A spiral roll of small iron wire being tipped with sulphur, the latter lighted, and then the whole plunged into this gas, the wire is ignited, and burns with the utmost brilliancy. This, then, is a most powerful supporter of combustion.

3. It is no less important to the support of life, whether animal or vegetable. Both plants and animals speedily die when introduced into any atmosphere which does not contain it. In five gallons of common air, there is about one gallon of oxygen: when this is greatly diminished, animals die.

If animals are brought into an atmosphere of pure oxygen, the effect is found to be too powerful; the vital functions are so stimulated as in a very short time to wear themselves out by a kind of fever, all of their powers being made to act with too much energy. A mouse or other small animal, placed in a jar of oxygen, will breathe very quick, be-

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come highly excited, and spring about with the greatest activity. Its powers, however, are greatly over-stimulated: exhaustion and death consequently soon ensue.

4. It is much heavier than hydrogen, and somewhat lighter than common air.

5. This substance is not only the grand supporter of combustion and of life, but is also the most powerful agent of destruction; for it has a property called by chemists *oxidizing*, that is, of uniting with nearly all other bodies and forming new combinations, leading either to a changed state of decay. Thus it is not only the promoter of life, but of death and decomposition.

It might be expected that a body of such immense importance should be abundant, and accordingly we find that oxygen gas is in larger quantity than any other element that is known. It forms, as has been said, a fifth of the atmosphere; in nine lbs. of water, there are eight of this gas; it exists largely in all plants, and, in combination with various inorganic bodies, it constitutes a large proportion of the solid crust of our earth. We meet it in all places, and see its effects on almost every known body. As the reader proceeds, he will find numerous references to its action, and will become better acquainted with its properties. In the very next paragraph below is an instance of its oxidizing phosphorus.

The last of these four most important organic substances, is Nitrogen. This gas is easily prepared in sufficient purity for purposes of experiment, by a very simple process. Common air, or our atmosphere, has been stated to contain one-fifth of oxygen; the remaining four-fifths are nitrogen. In order to separate this nitrogen, we invert an empty glass jar, and place the open mouth in water, thus confining within the jar a portion of air. Into this air is to be brought a piece of ignited phosphorus, contained in a little cup so as to float on the surface of the water. Phosphorus, as is well known, is very inflammable, While burning, it ignites with the oxygen of the air, and forms an important white acid compound called *phosphoric acid:* to this we shall have occasion to refer again. When the burning phosphorus is brought under the jar, the above described process at once commences, and continues till all of the oxygen in the air within the jar has combined with phosphorus. The nitrogen is now left nearly pure. A portion of the confined air expanded by heat, of course escapes at first, and the jar is filled with white fumes of phosphoric acid. These are gradually absorbed by the water, until at last the interior of the jar is quite clear.

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1. It is then to be perceived that this gas, like the two preceding ones, is colorless, inodorous, and tasteless. It has so few marked qualities, that it is much more easily distinguished from the others by saying what it is not, than what it is. Among its negatives, then, we find,

2. That it does not support combustion: a lighted taper, plunged into it, is extinguished instantly.

3. It does not burn itself, but remains unaltered after contact with flame.

4. It is a little lighter than atmospheric air. It will for this reason remain some time in a jar held with the mouth downward, but at once escapes if the jar be inverted. Both of these facts may be shown by a lighted taper.

5. It will not support vegetation alone, and animals soon die when placed in it. They do not seem to suffer from any active poisonous influence, but from a species of suffocation as in water.

This gas is admirably adapted to the purpose which it serves in the atmosphere, of tempering the too great energy of the oxygen. Being incapable of burning or supporting combustion, it prevents the general conflagration which would occur in pure oxygen, and also reduces its strength to the proper proportion for sustaining animal and vegetable life, without bringing in any poisonous or deleterious influences, as many other gases would do. We see then that its negative properties just fit it for its office.

I have been thus particular in describing simple processes for obtaining these gases, because every mind is better satisfied by direct and practical proofs. The experiments here given are so easy, that the most inexperienced experimenter could soon perform them without difficulty. There are few places of any size where the necessary materials and apparatus cannot be found, and obtained with little expense. Every teacher should illustrate his explanations by these proofs; thereby impressing an idea of each substance upon the mind, more indelibly than could be done in any other way. Many farmers could make them for their own satisfaction in leisure hours.

The reader will now understand why it is that I have urged the necessity of becoming acquainted with these organic bodies; for he has seen that they not only compose by far the larger proportion of the vegetable world, but that mixtures of two or three of them constitute the air we breathe, the water we drink, and in one shape or another, a large part of the earth upon which we live. Are not these eminently bodies with which all of every profession ought to be well acquainted; and most of all the farmer, who depends on them under various forms

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for all success; who cannot engage in the most simple operation without being influenced by them in different and most important ways? The man who knows the principal properties and the peculiar energies of the materials with which he has to do, provided he also has practical skill, is obviously in a much better position than the one who knows nothing of them, and scorns the very idea of learning anything from books. The former shapes his course from certainties, from actual reasoning, based on his own knowledge; the latter does any particular thing only because he has seen it done before, or, perhaps, because some other person recommends it.

Carbon is the only one of these four substances that is visible or tangible to our unaided senses, but we see that there are means of recognizing the others; that we are able to perceive their properties, and even to reason upon their various uses, with no less certainty than if we were able to grasp them in our hands and hold them up for inspection. Chemistry may thus be considered an additional sense.

INORGANIC PART OF PLANTS.

SUBSTANCES WHICH CONSTITUTE THE INORGANIC PART OF PLANTS.

It will be remembered, that although by far the larger portion of the plant disappears when fire is applied, there is always something remaining called *the ash*, or, as has been before explained, the inorganic part. This name *inorganic*, was given to denote a striking difference between these two great classes of bodies, the organic and the inorganic: the one being products of life and living organs; the other only taken by the organs to answer certain purposes, not having been formed by them, and not like them liable to quick destruction.

This ash constitutes so small a part of all living plants, that it was for a long time thought to be a species of accidental impurity; but after a time, it was found that certain substances were almost always present in the ash of every cultivated plant. The ash of the same plant, grown on different soils, was found to have a composition of nearly the same nature; thus showing that it did not take in indiscriminately every thing that might come in contact with its roots, but had a certain power of selection.

The organic part of plants, although so much the larger, consists at most of four substances; but in the ash, we occasionally find as many as ten. These are named as follows: *Potash*, *Soda*, *Lime*, *Magnesia*, *Oxide of Iron*, *Oxide of Manganese*, *Silica*, *Chlorine*, *Sulphuric Acid*, (oil of vitriol) and *Phosphoric Acid*.

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Here is a list of what may seem very hard names, but neither the farmer nor the scholar must be frightened at them: when he has once seen the substances to which they belong, and has learned by experience their more important properties, he will perceive that he is really able to comprehend something about them, and will at once recover from the feeling of dread and aversion which they at first excited. There may be some consolation, too, in the knowledge that the above list comprises the greater portion of the new words which will be employed in the succeeding parts of this essay. We will, then, now commence with good courage, and notice each of these inorganic substances separately.

Potash is well known as the extract by water from wood ashes, boiled down to dryness. *a.* It attracts moisture from the air when strong, and, if touched to the tongue, causes an acrid burning sensation, called by chemists *an alkaline taste;* it is often strong enough to destroy the skin, and may be purified to such a strength as to corrode almost every perishable substance. *b.* When purified in the ordinary way, potash forms pearlash, which is simply potash deprived of the foreign bodies with which it was contaminated, and carbonated or combined with carbonic acid: in this state it is nearly white. *c.* Potash is quite abundant in plants: more so in some classes than others. It is injurious to some kinds of weeds, or at least is used to extirpate them, by bringing in better kinds.

Soda. We do not often see this substance by itself, but almost always in combination with other bodies. *a.* Some of the more common of these are carbonate of soda, that is, the common washing soda of the shops; and chloride of sodium, that is, common salt. Both of these compounds contain a large proportion of soda. *b.* It is white, and when pure has the same attraction for water, the same caustic and burning taste, as potash; in fact the two are much alike in many of their properties, and also in the purposes which they seem to serve in plants.

Lime is a very common substance, and is well known in all its usual forms. *a.* As quick or caustic lime, it is of a white color, having a strong burning taste, and powerful caustic properties. It absorbs large quantities of water, and at the same time becomes hot, falling into a fine powder. Fresh burned lime, when exposed to the air, does not remain long in this caustic state, but drinks in moisture and crumbles gradually away. *b.* In nature it is always found combined with some other body, as, for instance, the common limestone, (carbonate of lime) or the sulphate of lime, (gypsum or plaster of Paris) which are both most abundant rocks. Common limestone or marble, when burned,

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becomes quicklime. The phenomena of slaking quicklime are easily shown and explained. Every ton of quicklime, during slaking, absorbs one-fourth of a ton of water, which becomes a part of the stone itself.

Magnesia is not so well known as lime, although it is abundant on the earth's surface and in many rocks. *a.* The most common and easily obtained form, is the calcined magnesia of the shops. This is a light, white, tasteless substance, familiar to all who use much medicine. Epsom salts, so much in vogue as a medical prescription, is another compound of magnesia. *b.* When burned, magnesia has something of the caustic properties of lime, but not by any means to the same extent. It is a constituent of many rocks, and particularly of one class of limestones, hence called magnesian limestones, or sometimes dolomites. Although magnesia is necessary to plants, it is found that too great a quantity of lime made from these dolomites is decidedly injurious to crops.

Iron, in its metallic state, presents an appearance that must be familiar to all. This metallic state, however, that of a hard, bluish gray substance, is not found in nature. The metal, as extracted from the ore beds and mines, is always in combination or union with some other body. *a.* Most commonly it is united with oxygen, forming what are called *oxides*. Metallic iron has a strong tendency to form these oxides. Every one knows that if bright iron be exposed to the air for any length of time without protection, it speedily becomes covered with rust, particularly if the place where it lies be damp. The farmer finds that his bright plow, exposed to a shower or to a night's dew, becomes streaked with rust. This rust is an oxide of iron; that is, a portion of the metal has united with a portion of oxygen from the air, and has thus formed this new compound.

b. There is more than one oxide of iron, but that which is usually found in plants, and which is commonly known under the name of iron rust, is called by chemists *the peroxide of iron;* this is to distinguish it from another oxide, to which we shall have occasion to allude subsequently. From such a distinction being made, the inference will naturally and correctly be drawn, that the oxygen and the iron unite in *definite proportions:* a certain quantity of iron unites with a certain quantity of oxygen, to form the peroxide; if the proportions are altered, we have some other oxide. Where, however, there is an abundance of oxygen, it is always the peroxide that is formed: hence we invariably find this oxide on exposed iron surfaces, and in plants.

The substances hitherto described have all been those that are found quite abundantly; but that which is now to be mentioned, *the Oxide of Manganese*, is more rare. Many species of our cultivated plants are

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found to be without it in their ash far more often than with it; and when it is present in the soil, we cannot, from any experiments hitherto made, see that their growth is more luxuriant. In some trees it is said to exist abundantly; but for the ash of our cultivated crops generally, I am inclined to think that it can scarcely be considered an indispensable constituent. Manganese is a metal somewhat resembling iron, but much less abundant. It also is always found in some compound form, never as a pure metal. It forms oxides with oxygen; and one of these, the black oxide, is of much value in certain manufacturing processes. For these purposes, it is mined whenever it is found in large quantity. This black oxide may be obtained and shown to a class. As it is now largely used in some manufactures, it is a cheap article.

Silica is a substance that exists abundantly in almost all plants, often forming more than half of the whole ash. *a.* We see a nearly pure form of it in the common quartz crystals, or agate, or cornelian, or flint: these all consist almost entirely of silica. Specimens of silica, in some form, may be found in almost every neighborhood, as it is one of the most common minerals. When perfectly pure, it is a very hard, white substance, tasteless, and quite difficult to melt. The fine grains in ordinary sandstones are particles of silica. *b.* It is not dissolved in water, and even strong acids produce little effect; how singular then that it should be found so abundantly in the interior of plants!

Chlorine is a kind of gas. It is easily prepared by mixing a little muriatic acid with some of the commercial black oxide of manganese; a gentle heat being then applied, chlorine is given off, and is conducted into receivers in the manner before described under oxygen and hydrogen. *a.* Water, when cold, absorbs it largely, and therefore the water in the receptacle where the gas is collected should be hot. *b.* It is, however, so much heavier than common air, that it may be collected in sufficient quantity by carrying the conducting tube to the bottom of a jar or bottle. The top being partially covered, so as to prevent too free access of air and consequent agitation, the vessel can be filled with chlorine as readily as with water. *c.* If the glass is white, it will be perceived that the chlorine now filling it is of a decided green color.

d. The sense of smell should be tested cautiously in this case, as the gas has a most suffocating and distressing effect when inhaled even in small quantity. The consequences of a single breath of it taken by mistake, are often felt for days in its irritating effect upon the lungs and throat. The method of collection last mentioned will show that it is

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heavier than common air, but this may be farther illustrated by pouring it from one glass to another.

e. Phosphorus takes fire spontaneously in this gas, and so do several of the metals when powdered, antimony for instance. A taper plunged into it burns at first with an enlarged red smoky flame, but soon goes out.

f. Chlorine has a peculiar power of bleaching, and is used very largely in the arts for such purposes. Almost any of the ordinary calicoes may be bleached by placing them in water saturated with it. The color of red cabbage liquor is very easily destroyed by a very small quantity.

g. It unites with soda, one of the bodies already mentioned, and forms common salt, a substance having harmless properties in itself, and differing most widely from either of those out of which it is formed.

Sulphuric acid is the common oil of vitrol. *a.* It has commonly been called an oil, because of its thick oily appearance, but has few other properties of oils. It is, like them, rather soft and agreeable in its first feeling upon the skin, but this sensation is instantly succeeded by an intense burning pain; for the acid is so powerful in its corrosive effects as to destroy both skin and flesh wherever it touches. Cloth is at once ruined by it, eaten out in holes. A very small quantity taken into the mouth and swallowed is fatal, as all of the internal passages are destroyed or seriously injured by its contact. There have been many cases of death from accidentally swallowing even so small a portion as part of a spoonful. The name acid would naturally cause us to suppose that this liquid would be sour; and a taste of it, even when largely diluted with water, shows it to be so in the extreme. When thus diluted, so that the skin may not be at all affected, it is not poisonous, and has a rather agreeable taste.

b. If paper saturated with blue litmus, a substance to be found in many apothecaries' shops, be dipped into this or other acids, it will become red; if the paper thus turned red be dipped into a solution of potash or soda or ammonia, it will become blue again. This furnishes a test by means of which we can tell whether fluids are acid or alkaline.

c. Sulphuric acid is occasionally found in springs, uncombined with any thing. There are some in western New-York, near Lockport, where the water as it comes from the spring is sour as vinegar, owing to the presence of free sulphuric acid.

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d. This is a much heavier liquid than water. A stream of it poured gently into a cup of water from a small distance above the surface, can be seen to sink directly to the bottom. When agitated so as to mingle it with the water, the mixture becomes quite hot, because a chemical union takes place between the two liquids.

e. This acid, except in such cases as the above, is always found in a state of combination with some other substance, and then cannot be recognized by any of the properties which I have mentioned. In some of these forms of combination, it is very abundant. One of them, and an important one to the farmer, is gypsum or plaster of Paris. This, as is well known, is a solid, and has no acid taste; it, however, consists of sulphuric acid, united with lime, forming what is termed by chemists *sulphate of lime.* In every 100 lbs. of plaster of Paris are about 33 lbs. of sulphuric acid, 46 lbs. of lime, and 21 lbs. of water.

Epsom salts consist of sulphuric acid and magnesia; alum, of sulphuric acid, alumina and potash. From all of these the acid can be separated by chemical means. It is used largely for various manufacturing purposes, and is made by burning sulphur (brimstone), with certain precautions, in large leaden chambers. This acid will be subsequently seen to be a substance of great importance for various purposes in agriculture.

Not less important is the next body on our list, *phosphoric acid.* It is also very sour, and is usually seen as a white powder. If a stick of phosphorus is burned, white fumes are seen to rise in large quantity. The phosphorus unites while burning with the oxygen of the air, and forms phosphoric acid. If these white fumes are passed through water, it will become sour, as it dissolves the acid: they may also be condensed on a cold glass plate.

a. This body can be shown in a yet simpler manner by burning a common locofoco match: the white smoke which goes off at first before the sulphur ignites, is phosphoric acid. Phosphorus is used in the making of these matches, because it is a substance that inflames easily by a little friction. All who have rubbed them on a wall or board in the dark, have observed that they leave a quite bright, luminous trace, distinctly visible. If the match fails to ignite, the end of it will also appear bright, and the peculiar smell of phosphorus may be perceived.

Phosphoric acid does not seem to exist in so large quantity as sulphuric acid, as it does not constitute a principal portion of any of our rocks. It forms a very important part of the bones of animals.

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DIFFERENCES IN THE ASH OF CULTIVATED PLANTS.

We have now noticed each of the substances that were named as occurring in the inorganic part of plants, and have given such of their more remarkable properties and more common forms of appearance as seemed necessary to their recognition by the practical man.

It has been already stated, that with one or two occasional exceptions, they are all found in the ash of cultivated plants. Sometimes one and sometimes another is absent, but generally we find small quantities of nearly all. It does not follow from this, however, that every plant contains the same quantity of ash. The trunk of a tree, for instance, if deprived of its bark, does not yield more than from one to two pounds of ash in one hundred of wood, while the stalk of grass or straw of grain frequently contains from 6 to 14 lbs. in 100. There are some plants which scarcely contain any ash whatever, and others in which it forms a large proportion. This difference exists not only between various plants, but between the parts of the same plant.

If we examine the straw of wheat, we find usually 6 or 7 per cent of ash; the leaf contains 7 or 8 per cent, and the grain not more than 1 or 2 per cent. So in turnips or beets, the dried roots have no more than from 1 to 2 per cent of ash, while the dried leaves often leave from 20 to 30. These facts are to be remembered.

When we pursue our researches a step further, and separate the substances which make up the ash of different plants, we find that here also is a great variation. The ash of potatoes is more than half potash, while the ash in the grain of wheat contains much less potash, but is about half phosphoric acid. The ash of clover and lucerne often contains twice as much lime as that of herdsgrass or timothy hay.

We may thus divide plants into classes according to the composition of their ash. In the ash from the seed of wheat and all of our cultivated grains, phosphoric acid is the leading ingredient; in that from turnips, beets and other roots, it is much less, while the alkalies potash and soda increase; in the tubers of the potato they constitute more than half; in the grasses, lime and silica are more abundant, and in some, as the clovers, lime becomes a leading substance; in the stems of most trees lime abounds yet more, and in many cases exceeds in quantity any thing else. These facts have a marked bearing on many practical points which we have yet to consider.

It was stated that the quantity of ash varied in different parts of the same plant, as, for example, in the straw and the grain of wheat. This variation in quantity is not more marked than that in the composition of these two ashes. In the ash of the straw we find that there is a

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great proportion of silica, and very little phosphoric acid; while in that of the grain, more than half is phosphoric acid, and there is scarcely any silica. When we come to consider the purposes for which these parts are intended, the cause of such variations will be plainly perceived. We even find in many plants a distinction between the composition of the ash at the bottom of the stalk, and that at the top. In all cases the ash from the husk which covers the seed, as in oats, barley or buckwheat, differs exceedingly in its constitution from that of the seed itself. We shall subsequently see what is the character of this difference, and understand at least a part of the reasons for it.

We have now called attention to several valuable facts respecting the inorganic part or ash of plants:

1. All of the inorganic substances described are generally present in our cultivated crops, but not invariably: sometimes one or two are absent.

2. The quantity of ash yielded by different plants varies.

3. The composition of this ash also varies, and in as great a degree as the quantity.

4. This applies not only to different kinds of plants, but to different parts of the same plant.

Upon these four points depend many of the most important discoveries in agriculture, and we shall find them connected very intimately with all of the leading subjects which are yet to engage our attention. Let the reader, then, before proceeding farther, understand them thoroughly and impress them upon his memory.

SOURCES OF THE FOOD OF PLANTS.

ORGANIC FOOD OF PLANTS.

Having named and described the various substances from which the ash of plants is made up, and which may therefore be considered their inorganic food, we must now see what are the sources of their inorganic, as well as of their organic food.

An organic and inorganic part being absolutely essential to the existence of every perfect plant, it becomes necessary that the farmer should know where the different bodies come from, that are to make up these parts. This knowledge is of advantage, as enabling him to increase natural sources of supply, or to devise artificial means of furnishing what is deficient.

It is quite clear that a plant which is to grow rapidly, must have a constant supply of the two classes of food; and, moreover, that this

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supply must be presented in a shape immediately available. It is of no use to the crops of the present season, to say to them that there is an abundant supply of manure in the barnyard; they want it near their roots, and will not flourish without it there. So of all other things required in the soil, they must not only be present, but must be in a soluble state, capable of immediate employment in building up the plant. The farmer, then, who knows best what is needed, knows how to furnish it so as to have the best crops, and at the least expense.

An examination of the leaves and of the roots of a living plant, shows that it obtains a portion of its food from the air, and a portion from the earth.

a. Inorganic food, consisting as it does of solid bodies, does not of course exist in the air, and must therefore all be taken in through the roots.

b. The organic food comes partly from the soil, and partly from the air through the leaves. It may be asked, How we know that plants get food through their leaves? This is easily proved. If we place the stem and leaves of a growing plant in a portion of confined air, the composition of which is known, and that air be re-examined by means of chemical tests a day or two afterward, it will be found that its composition has changed; a portion of it has disappeared, having been absorbed by the plant through its leaves.

c. If the confined air, for instance, contained carbonic acid, a portion has gone, and its place is supplied by oxygen.

d. If there is no carbonic acid present in the water or air, the action will not go on. The importance of these facts will soon be perceived.

We have seen something of the forms in which plants may receive their inorganic food; that it is not usually as simple substances, but in some forms of combination. Thus potash does not enter the roots as potash alone, but as sulphate or carbonate, or silicate of potash; that is, in combination with sulphuric acid, or carbonic acid or silica. So it is with organic food; the four gases which we have examined do not ordinarily minister in their simple state to the growth of plants, but, as do the inorganic substances, in some form of combination.

CARBONIC ACID, ITS SOURCES AND PRINCIPAL PROPERTIES.

One of the most important of these combinations, is known to chemists as carbonic acid gas. This gas is very abundant in nature, and combines with many solid substances, forming what are called carbonates.

a. Common limestone is a carbonate of lime; and if muriatic acid be poured upon it, a violent effervescence takes place, caused by the escape of this gas.

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b. So in the common soda powders, the soda is a carbonate of soda; and when tartaric acid is added, a violent effervescence ensues, as all have often seen. This, too, results from the escape of carbonic acid gas.

c. It causes the froth on beer, and on the surface of all fermenting liquids.

It is easily collected in glass receivers over water, in the same way as heretofore described. Pouring muriatic acid upon common limestone powdered, or upon carbonate of soda, is a convenient and cheap method of obtaining this gas. If it be done in a tall glass or wide-mouthed bottle, the gas will rise and fill the bottle, so that its properties may be examined.

1. The first thing apparent will be, that a lighted taper plunged into the bottle is instantly extinguished; thus showing that the gas neither inflames itself, nor supports combustion.

2. It will be perceived that carbonic acid gas is heavier than common air. It does not rise and mingle with the air, but fills the vessel like water. The taper will burn freely until it reaches its surface, and for a moment even after the lower part of the flame is immersed. When the vessel is full, the gas, in place of rising, flows over the edge and downward, as water would do. It may be poured from a vessel upon a candle or taper so as to extinguish it, provided that there be no strong draft to sweep it away. It may in this manner be transferred from one vessel to another.

3. A third important property of this gas is, that all animals compelled to breathe it instantly fall, and in a few moments die. This may be shown by placing a mouse or other small animal in an atmosphere of it. Owing to its weight, it sometimes accumulates in sheltered hollows, and is the cause of fatal accidents. In brewer's vats when fermentation takes place, and in some wells, it is apt to collect, and persons lowered incautiously to clean them suddenly fall insensible. All danger may be avoided by simply lowering a lighted candle before any one goes down: if the candle burns freely at the bottom, there is no risk in descending.

This gas consists of carbon and oxygen; 6 lbs. of carbon and 16 lbs. of oxygen forming 22 lbs. of carbonic acid. Chemists call it carbon 1 and oxygen 2. It is easy to prove this fact by burning charcoal, which it will be remembered is one form of carbon, in a jar of pure oxygen gas. When the charcoal has ceased to burn, the air remaining in the jar will be carbonic acid; as carbon and oxygen were the only two substances present, the carbonic acid must plainly have been formed by their union in certain proportions.

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This is another instance of those strange chemical changes in the properties of bodies, with which all who study this subject soon become familiar. Carbon, a hard inflammable solid, unites with oxygen, a light gas, supporting combustion and animal life in a most remarkable degree; to form another kind of gas, having a much greater weight, entirely incombustible, and, when unmixed with air, destructive to almost every form of life.

Carbonic acid exists naturally in very large quantity. It is invariably present in the atmosphere. For a long time this was thought to be accidental, but later experiments have shown that it is always there in very nearly the same proportion. This proportion is quite small, being only $\frac{1}{2500}$th of the whole bulk, or about $\frac{1}{1500}$th of the whole weight. It seems insignificant, too much so to be noticed; but when we come to calculate from the known weight of the atmosphere on each foot of the earth's surface, we find that there is in the air over each acre of ground about seven tons of this gas. This is a considerable quantity, and, when calculated over the whole surface of the earth, amounts to billions of tons. It is found to be just graduated to the wants of both plants and animals. All living things, as has been said, die in an atmosphere which contains a large proportion of this gas. Plants, however, require a certain portion of it to be spread through the air, that they may draw it in through their leaves. This is necessary to their life, as they will not live for any length of time in an atmosphere where there is no carbonic acid gas, and will not flourish if the proportion of $\frac{1}{2500}$th be greatly reduced. On the other hand, if this proportion be much increased, if more carbonic acid be introduced into the air, the effect is also injurious. The proportion of carbonic acid may with benefit be increased, according to some experiments, so long as the sun shines and daylight continues. When the sun goes down, however, and darkness comes over the earth, more of this gas than is usually present does harm. We see, then, that the Creator has regulated the quantity of carbonic acid, so that there is just enough for the necessities of the plant, and not so much as to injure either plants or animals, while at the same time regard has been had to the alternations of day and night.

CARBONIC ACID GAS OF THE ATMOSPHERE ABSORBED AND DECOMPOSED BY THE LEAVES OF PLANTS.

It has been said that this gas is necessary to the life of the plant, and that the leaves draw it in from the air. Those who have never studied the structure of the leaf, will be surprised to find how admirably it is adapted to this purpose. When examined by a microscope, its whole

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surface is seen to be covered with minute pores, both above and beneath; each of these pores is a species of mouth, intended to receive food, or to give off something that the plant no longer requires. These pores have an immense variety of shapes and sizes in different leaves, as shown by the microscope. A high magnifying power discovers more than 170,000 openings in a square inch upon the surface of some leaves; others have not more than 6 or 700.

It is easy for any person to satisfy himself that such pores do actually exist, and that the different sides of the same leaf have different properties. A common cabbage leaf, for instance, when applied with the under side to a wound or cut, will draw quite powerfully, inducing a discharge, while the upper or smooth side will produce no such effect; thus showing that on the under side are pores which have a power of absorption.

If the leaves were few in number and very small, it would be difficult for them to collect enough carbonic acid from the air; but we find that all plants which grow rapidly have either quite large leaves, or a great number of small ones. Thus they are able to expose a great extent of surface to the passing wind, and to draw from it as much food in the shape of carbonic acid as they require. It has been found that very quick growing plants, such as grape vines, melons, indian corn, etc., when in full growth, will absorb as it passes nearly all of the carbonic acid from quite a swift current of air, so that only very slight traces of it can afterwards be found. How active must every little mouth on the leaf be at such a time!

a. The effect of the carbonic acid thus absorbed, is to hasten the growth of the plant by furnishing part of the materials from which its stalks, stems, leaves, etc., are composed. But it may be asked, is the whole of the carbonic acid used, or only a part? We remember that it is composed of two substances, oxygen and carbon; are both of these, or only one, retained?

b. It is not difficult for the reader to satisfy himself on this point. If the leaves of a flourishing growing plant be immersed in an inverted vessel full of water, and exposed to the rays of the sun, little bubbles of air will gradually begin to form, and to increase in size until they rise and collect in the upper part of the vessel. If fresh branches be occasionally placed in the water, and the operation thus continued for a time, enough air will be collected for purposes of experiment, It will then be found that this air, which has thus escaped from the surface of the leaves, shows all of the properties which were described under oxygen. It is in fact pure oxygen, thus showing that the carbon of the carbonic

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acid, is retained in the plant to constitute a portion of its bulk, while the oxygen goes off through the pores of the leaf. The pores in the under side of the leaf usually effect the absorption, the decomposition goes on in the interior, and the oxygen is given off through the pores on the upper part. These pores have for their office to give off, while that of the others is to receive. Some plants will live for a long time, if the under surface of the leaves is kept constantly wet; if the upper only be wet, the plant soon dies. If either surface be varnished, so as to stop the pores, great injury results.

During daylight, the leaves are constantly absorbing carbonic acid, and giving off oxygen; but as soon as the sun goes down, a change takes place; an examination will now show that it is carbonic acid which passes off from the leaves, and oxygen that is being absorbed. It is just the reverse of what goes on during the day.

a. This curious fact shows why it is that plants grow so rapidly in the long days of summer. The nights are then comparatively a small portion of the day, so that for by far the greater part of the twenty-four hours the plant continues to absorb carbonic acid, and to build itself up with the carbon thus obtained.

b. In Greenland and Kamschatka the summer is not more than two or three months, but during that time it is always daylight, the sun scarcely going below the horizon at all. Certain plants are thus enabled to grow so fast as to mature and ripen their seed, even in that short summer. We see how this beautiful provision of nature tends to equalize different climates. If the nights of the short Greenland summers were even so long as our shortest, their crops would never ripen; but as they have nearly perpetual day, they can get enough food from their fields to sustain life during a large part of their long winter.

CARBON ALSO OBTAINED BY PLANTS FROM THE SOIL.

We see that plants are able to obtain much carbon from the air, but it is found that a considerable quantity comes from the soil also. This is all, in one form or another, drawn in through the roots. The rain water which falls upon the surface, and all of the spring water found there already, contains some carbonic acid dissolved. This water entering the roots, carries with it a variety of substances in solution, which the plant seems to use or not as it may require; among these is carbonic acid. This is probably the chief form in which carbon is obtained from the soil; but there exist in contact with the roots, other sources of this important article of food. Every soil contains more or less of organic matter, derived from the decay after death of plants and animals. Where abundant, this gives a black color to the soil, and one containing

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a large proportion of it is frequently described by farmers as a vegetable mould. While plants, etc. are decaying to form this mould, various compounds containing carbon are the result. Quite a number of these have been examined by chemists, but it is not necessary to say much of them here.

a. *Humus* is a name often given to the black mould of a rich vegetable soil, and this probably because a great part of the mould consists of a substance called *humic acid.* This acid may be obtained by boiling some rich mould or peat in a solution of common soda, continuing for an hour or two; filtering through a piece of blotting paper, and then making the liquid quite sour with muriatic acid. Little brown flocks will soon begin to appear, and will fall to the bottom: these are humic acid.

b. This substance may serve as a specimen of a large class that are contained in the organic part of the soil. They all consist of carbon, oxygen and hydrogen and in many situations are extremely abundant. They do not decay or dissolve very easily, and it is not supposed that plants get a large part of their carbon in this way. It seems certain, however, that they do get some; and it is found that in most cases where soils contain much of this organic matter, they are quite fertile. In all ordinary situations, it is supposed that at least two-thirds of the carbon in plants comes from the air, the remaining third in various forms from the soil. This is shown by the fact that plants cultivated year after year, cause the organic matter of a soil to diminish quite rapidly.

SOURCE OF THE OXYGEN AND HYDROGEN OF PLANTS.

Beside carbonic acid, the leaves of plants absorb through their pores a large quantity of water. During the day, when the hot sun is upon them, the evaporation is of course far more than the absorption, and in a dry time the leaves may be seen to droop in the afternoon; but let the sun be obscured and the atmosphere become misty and damp, and they soon absorb enough moisture to strengthen their failing stems. Every farmer knows that a light shower, which only moistens the leaves without wetting the ground at all, will revive his crops for many hours. Nothing in this case can have been taken in through the roots.

Water, as has been said, is composed of oxygen and hydrogen. These two bodies are needed by the plant, and water is consequently not only of service in moistening its various parts and furnishing a circulating fluid, but gives its oxygen or its hydrogen or both, as the plant may happen to require. Water has a peculiar adaptation to this purpose, and to others equally useful in the interior of the plant, in the facility

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with which it is decomposed. Carbonic acid and other chemical substances only decompose with great difficulty; but the elements of water, a substance so universally diffused and so indispensable, separate easily, affording hydrogen here, oxygen there, to the necessities of the plant.

SOURCES OF THE NITROGEN OF PLANTS.

We have now seen how the plant gets carbon, hydrogen and oxygen in abundance; but there is yet one more of the organic bodies, which is so necessary to the plant; this is nitrogen: it remains for us to consider the most probable source of this gas. *a.* As it has been said that the atmosphere consists of oxygen and nitrogen, we might naturally conceive that the leaves absorb this gas, as well as carbonic acid. Experiments have shown that this is not the case to any extent. After many careful trials, it has not yet been certainly proved that any nitrogen at all is obtained by the greater number of plants in this way. If there is, the quantity must be in most cases very trifling indeed.

b. This is one of the most remarkable points connected with the nutrition of plants. Here we have, in the air which surrounds the plant, and presses against every part of it, an immense quantity of the gas nitrogen. It constitutes four-fifths of the whole atmosphere, and yet we cannot find that plants absorb it in any quantity whatever. On the contrary, as we have seen, they select out another kind of gas, carbonic acid, although it is present in so small a proportion as $\frac{1}{2500}$th. This shows conclusively that the leaves do not draw in through their pores every thing that is presented to them indiscriminately, but that they have a power of choosing those kinds of food best adapted to their wants.

c. Thus the smallest plant has the power of doing what man by his unaided senses never has been able to accomplish, and which he has only learned to do by artificial means within a few years. Every little worthless weed by the wayside has its leaves spread, its thousands of mouths open, selecting and drawing in from the passing air food best adapted to its wants.

As plants obtain, according to the above statements, little if any of their nitrogen from the air directly through their leaves, they must obviously get it in some way through their roots. There are two bodies which are now considered the chief sources of supply: these are called *ammonia* and *nitric acid.*

Ammonia is a gas, composed of nitrogen and hydrogen. We do not find it largely in this shape, however, on account of the strong tendency

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which it has to unite with other bodies, such as carbonic acid, sulphuric acid, etc. When it cannot find any thing else, it is at once absorbed by water, which will take up an immense quantity of it before becoming saturated. A pint of cold water will absorb between 600 and 700 pints of ammonia. The aqua ammonia of the shops, is water through which ammonia has been passed until it is very strong. By smelling of it, the extremely pungent and peculiar odor of ammonia is perceived. The strong aqua ammonia is so powerful in its effects as to take away the breath, and cause a momentary suffocation. A more agreeable form of ammoniacal odor is in the ordinary smelling salts. These are usually nothing more than carbonate of ammonia, scented in various ways with other perfumes.

The properties of ammonia ought to be understood by every farmer, because it is a substance of much importance; it does not exist so abundantly in the soil as do many or most other necessary ingredients, and consequently he ought to know how best to increase its amount, and how to keep it on his farm when he has got it there.

Ammonia is very easily lost, because driven from its combinations with great facility. If, for instance, you mix with muriate of ammonia, a compound which has little or no smell of the gas, some quicklime, and rub the two together, there will immediately a strong smell of ammonia be perceived, passing off into the air and disappearing. This is the reason why quicklime should not be mixed with manures containing ammonia, as that gas is driven off by it, and the value of the manure greatly diminished.

Nitric acid, (common aquafortis,) is another important source of nitrogen. This acid is composed of nitrogen and oxygen. It is to be found in druggists' shops, and is a nearly colorless liquid, having a peculiar smell, and being extremely sour and corrosive. *a.* When strong, it destroys the skin, and in all cases turns it of a deep yellow color, which cannot be removed by washing. *b.* It eats holes through cloth, turning it to a bright red color. *c.* Like ammonia, and the acids before mentioned, we do not find it naturally as a pure substance; it is always combined with something else. One of the most common forms is nitrate of potash, or saltpetre. Nitrate of soda is also often found in nature. *d.* In South America, this latter is so abundant as to be brought away by the shipload. It is in the form of such compounds as these that nitric acid is present in the soil. They are easily dissolved in water, can be received into the circulation of plants through their roots, and can furnish nitrogen as readily as ammonia.

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In some situations more nitrogen is received into the plant as ammonia, than from any other source; in others more as nitric acid. I consider that this is owing simply to the quantity of either that may be present in different localities. Both kinds of manure produce remarkable results when applied to the soil of most farms; and these effects are nearly or quite identical in appearance, showing that in both cases, nitrogen caused the improvement, and that between these two forms of applying it there is little choice.

OF THE ORGANIC SUBSTANCE OF PLANTS.

STRUCTURE AND FUNCTIONS OF THE PLANT IN ITS SEVERAL PARTS.

The different external parts of plants are well known; they consist of roots, stems, bark or epidermis, and leaves.

The internal structure and the functions of the *roots* are not so perfectly understood as that of the other parts, owing to the difficulty of knowing exactly what occurs underground. At a short distance beneath the surface they begin to divide, sending out little rootlets in every direction, and at the extreme end of each is a small bundle of soft, minute, white fibres. These are all so many mouths for the nourishment of the stem. If you place the roots of a growing tree in certain colored liquids, its body will soon become colored. This part of the plant has, to a considerable extent at least, a power of selection, as it is found that certain substances are admitted to the exclusion, either partial or total, of others. Some coloring solutions for instance, as above, enter with facility and tinge the whole stem in a short time, while others are scarcely absorbed at all. The same must, in a degree, be true of various kinds of food, as we find that far more of one kind is taken than of another, even when both are present in equal quantities.

In the *stem* are numerous little tubes running up and down, which serve to convey the sap absorbed by the roots up to the leaves. It passes up in the interior vessels or tubes, and passes down in the exterior, or just under the bark. This can be shown by the example of the tree and the colored fluid, just referred to; the inner part of the tree will be colored first, and finally the outer, in the descent of the sap, after it has passed out to the extremities of the branches.

There is then a regular circulation between the soil and the plant; sap flows up, having been formed in the roots and stem, out of the various substances drawn in from the soil, and ultimately flows down again next the bark and out into the soil.

During its circuit the sap undergoes many changes, and deposits such

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of its constituents as are necessary to the plant. If taken ftom the lower part of the stem, it will be found thin; as it goes up, it appears thicker and thicker, and at last on its way down becomes a dense substance, to which the name of cambium bas sometimes been given. At this period of its round, it deposites between the inner bark and the wood, material for forming the annual layer of new wood. The cause of this ascent and descent of sap is not fully known, and I do not consider it necessary to mention here the numerous plausible theories that have been advanced regarding it. If the flow is entirely stopped, either upward or downward, the plant soon dies. This is shown by the ordinary operation of girdling a tree, the downward flow is stopped and no new wood can form.

The *bark* is quite different in its structure from the stem. In the latter part, as will be remembered, the little tubes run perpendicularly, or straight up and down; in the bark they run vertically, that is, toward the centre of the tree. It is supposed that air obtains access to the body of the plant through these tubes.

Leaves are usually considered an extension of the bark. They have a net work of veins running through them in every direction, conveying fluids to all parts; and also have on their outer surfaces, innumerable little pores or mouths, through some of which they breathe out, and through others draw in, water and various gases. These functions of the leaf will be noticed again subsequently.

THE GREAT NUMBER AND DIVERSITY OF ORGANIC BODIES IN PLANTS.

The organic portion in these several parts of the plant, consist of a great variety of substances, with the more common of which at least, the farmer ought to be acquainted.

The organic bodies of plants are exceedingly numerous. Almost every plant has some one or more peculiar to itself. Thus we see Indian rubber the product of one tree, gutta percha of another, sago of another; various perfumes from one plant, and disagreeable odors from another, as in the rose or the mignonette of one class, the skunk cabbage or the tomato of the other; some also have a pungent or aromatic taste, such as the sassafras and the birch. In short, the variety of bodies that thus communicate different qualities to plants, or often to the different parts of the same plant, are more numerous than would be believed by one who had not attended somewhat to the subject.

The different oils and sugars, for instance, which exist in vegetables, may be counted by tens and twenties already, while new kinds are constantly being discovered; so with the various extracts which can be

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obtained from the flowers or bark. There are few plants in which a careful examination of their various parts will not discover from fifteen to twenty different organic substances, and in some twice that number may be distinguished. The perfect separation and determination of such bodies, is among the most difficult of problems of modern chemistry. But after all, the substances which make up the great bulk of plants are few in number. Those which give the color, taste, smell, or peculiar properties of that kind, to particular plants, generally form but a small part of their whole mass, and have but little influence on their practical value.

OF WATER.

In order to explain some remarkable properties in the substances to which attention will soon be called, it is necessary here to mention the composition of water.

This liquid, so universally diffused and of such inestimable value, is composed of but two gases, oxygen and hydrogen. In nine pounds of water, are about one of hydrogen and eight of oxygen. Although the weight of oxygen is thus greatest, hydrogen is so light that it constitutes the greatest bulk; so that by measure there is only one gallon of oxygen to two of hydrogen.

a. That water does consist of these two gases alone, may be shown by burning hydrogen in an atmosphere of oxygen. Water will immediately begin to condense on the sides of the vessel used by the experimenter, and will soon accumulate so as to run down in drops. Some of the French chemists once tried this experiment on a large scale, continuing it for a number of days, and obtained several pints of water. On burning a jet of hydrogen in common air, under a large glass vessel open at bottom, water will immediately be formed by an union with the oxygen of the air, and will condense on the cool surface of the glass.

b. Water exists in several states: 1. As the simple liquid; 2. As steam or vapor; 3. As ice or snow. Each of these forms have their peculiar properties and benefits. As a fluid, it renders the bodies of all animals plump, moist, and elastic, while it also gives life to all plants and vegetables, forming their circulating fluids.

As a vapor, it prevents the outer surfaces of plants and animals from drying away too much, intercepts the rays of the sun which would otherwise scorch and burn us, and performs many other important offices of which there is not space to speak here. As ice, its action is alternate freezing and thawing, thus expanding and contracting, is to loosen and

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mellow the soil. This is the effect produced by ridging stiff clays in autumn that the frost may have free access.

OF ORGANIC BODIES CONTAINING CARBON, HYDROGEN, AND OXYGEN.

By far the most abudant body in the organic part of all or nearly all plants, is called *woody fibre*, sometimes cellular fibre. This is the stringy, woody part of straw, flax, hemp, wood, &c. If any of them are bruised and soaked until every thing that can be washed away is gone, a mass of white fibre remains, which is tolerably pure woody fibre. Cotton or pith are the purest natural forms of this substance. *a.* It is white, tasteless, insoluble in water, and will not in its natural condition support life. *b.* It constitutes the largest portion of nearly all plants, that is, in their dry state; this distinction is necessary, because many plants lose more than half of their weight of water by drying; this may be seen in most of the common grasses.

Woody fibre is composed of carbon, hydrogen, and oxygen. Now it is a curious point, that in this woody fibre, hydrogen and oxygen are present in just the proportions to form water. To this important fact we shall refer again.

In the stems, leaves, husks, bark, and in most cases the roots, woody fibre is by far the largest constituent; but in the seeds and fruits, it is usually much smaller in quantity.

In a great number of seeds, *starch* is the leading ingredient; so also in many roots that are used for food. *a.* Starch is in its usual appearance well known, as a white tasteless, or nearly tasteless substance. It does not dissolve even in warm water, but forms a species of jelly with it. One peculiar property is that of turning blue when iodine comes in contact with it. The common tincture of iodine will answer for this experiment: the smallest possible quantity will produce an immediate effect.

b. Starch may be easily obtained by making some wheaten flour into dough, and then washing on a very fine seive or linen cloth placed above a convenient vessel. As the dough is kneaded under successive portions of water, the water becomes milky, and the mass of dough constantly diminishes in bulk until at last nothing but a sticky substance called *gluten* remains; to this we shall refer again. If the milky liquid which has run through the cloth be allowed to stand quiet for some hours, a deposit of fine white grains will be formed on the bottom of the containing vessel: this is the starch.

c. It may also be easily extracted from the potato, by grating fine and washing. The starch will settle next the bottom; the skin, woody

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fibre, etc. will float above, so that they may be poured off. In this way potato starch is made.

The composition of starch is carbon, hydrogen and oxygen; the same, it will be remembered as that of woody fibre. These substances exist in the same proportion as in woody fibre.

Another important organic substance is *sugar*. Its properties of easy solubility and sweetness need scarcely be mentioned here, neither will they require illustration by the teacher.

There are several kinds of sugar present in plants, but the kind called *cane sugar* is most abundant and important. It is that which exists in the stalk of the sugar cane, the root of the sugar beet, the trunk of the sugar maple, etc., etc. Sugar blackens and becomes a species of charcoal when burned; it consists of carbon, hydrogen and oxygen. These same three substances also form the gums, resins, and oily matters which exist so abundantly in certain trees, as the pines, and in certain seeds, as linseed.

Thus by far the larger portion of plants is made up of substances containing only these three gases. We now come to a singular fact, hinted at with relation to one of the substances in the early part of this section: the hydrogen and oxygen in woody fibre, starch, sugar and many gums, are in the proper proportions to form water. The plant then can make these bodies without difficulty, for we have seen that it absorbs both carbonic acid and water through its leaves: if now the oxygen of the carbonic acid be given off through the leaves during the day, as we have already mentioned that it is, there remains only carbon and water, or carbon, oxygen and hydrogen, just the substances to form those bodies which we have named above.

In the case of woody fibre, sugar, starch and gum, the quantity of carbon and of the elements of water is the same, so that they are in fact identical in composition. How strange that they should be so different in properties! We cannot explain why this is; but yet the chemist is able to make sugar from either woody fibre, gum or starch. It is not more strange than a thousand other things in nature. We have seen, for instance, that carbonic acid puts out all fire and destroys life; yet carbon, one of the substances of which it is composed, burns most violently in oxygen, the other; and this other body, oxygen, is, when alone, the great supporter of vitality: mingled in the air, it is what sustains all animal and vegetable life, and all combustion also.

It has been incidentally noticed, that certain of the bodies above named may be changed by chemical means. Some of these changes are important, and deserve a rather more extended notice. *a*. Woody

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fibre, if ground fine and subjected to a certain degree of heat for a long time, becomes hard, and yellow in color, and finally can be ground like flour. In this state it is partly soluble, and can with yeast be made into a light, wholesome bread; it has also been partially changed into a substance resembling starch or gum. *b.* Starch, if heated at a tempeperature just below scorching for a day or two, gradually becomes yellow and finally quite soluble, with a sweetish taste. It has become *dextrine*, or what is called by calico printers *British gum.* This change takes place to a considerable extent in the ordinary baking of bread. *c.* By the action of dilute sulphuric acid in certain proportions, and at certain temperatures, starch may be changed first into gum, and then into sugar.

We thus see that this class of bodies are not only similar in composition, but that a change from one to the other may be effected with much ease. If we can do this, how much the more readily can it be effected in the interior of the plant! That such changes do take place there, and that they are of much practical importance, we shall have occasion to point out in subsequent parts of this essay.

OF ORGANIC BODIES CONTAINING CARBON, HYDROGEN, OXYGEN AND NITROGEN.

Although the substances containing the three first named gases only, make up more than nine-tenths of most plants, yet there is a class which in addition to them contains nitrogen. This class, though so small in proportion, is, as will be seen ultimately, one of remarkable importance.

The most easily obtained of these nitrogenous bodies, is the one already mentioned as left behind when the dough of wheaten flour is washed upon a cloth, to obtain the starch. *a.* It is sticky, tenacious, and somewhat like glue in its character; its name *gluten* has reference to these properties. *b.* When heated, it swells up to a great bulk, becoming quite full of holes. For this reason flour which has much gluten in it, is called by the bakers *strong*, because light porous bread can be easily made from it, and because it absorbs and retains much water. *c.* The proportion of gluten in wheat is from ten to twenty per cent. The wheat of warm countries is said to contain more than that grown in temperate latitudes.

Several other grains contain gluten, but none so much as wheat; they all, however, have bodies of the same class, not generally resembling gluten in appearance and properties, but all containing nitrogen. To these, different names have been given: the nitrogenous substance in peas and beans is called *legumin*, that in indian corn, *zein.* In some other plants there are substances of the same kind, callled *vegeta-*

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ble albumen, casein, etc. These are all somewhat similar in their properties and composition. There is a little sulphur and phosphorus in gluten, and in these nitrogenous bodies generally, beside the four gases already mentioned.

It will now be seen what an important part these four elements act, in the economy of nature. From them all the forms of vegetable life are built up; they are constantly passing from one state of combination into another, and yet always come out at last themselves unchanged. This is for the reason that they are truly, and not in the common sense, elementary bodies. If we take a piece of wood for examination, we can divide it by various means into oxygen, carbon and hydrogen; but we fail in any attempt to subdivide again either of these three bodies. Those bodies then are elementary, chemically speaking, which we can not by any means decompose or separate, which we cannot show to be compound. There are in all between fifty and sixty of these elements known, and among them are the four gases, the functions of which we have been considering. Sulphur and phosphorus are also elements.

OF THE SUPPLIES OF ORGANIC FOOD TO PLANTS.

The sources from whence plants derive their various kinds of organic food, are different in different localities.

Carbon is mostly drawn in from the air in the form of carbonic acid: some also comes from the soil, but by far the greater part from the air. The quantity required for the support of all the vegetation upon the earth's surface must be immense, especially when we know the fact that carbon in general constitutes fully half, and sometimes much more than half of its weight. When we remember that the proportion of carbonic acid in the air is but about $\frac{1}{2500}$th of all, there may seem to be some danger of its exhaustion.

It has been said that the weight of this gas in the air over every acre of the earth's surface, is about seven tons. This quantity, if the land were all under cultivation, would be exhausted in from seven to ten years. There would thus be some cause for apprehension on this point, could we not indicate several sources which constantly tend to keep up the necessary supply.

1. One of the most important of these is the breathing of animals: the pure air that is drawn into the lungs at each breath, returns charged with carbonic acid. It is for this reason that the air in a close room, where there are many people, becomes so unwholesome, and after a time intolerable. The carbonic acid breathed out into the air, has rendered it deleterious to animal life. A direct proof of the quantity of

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carbonic acid breathed in this way from the lungs, may be given by blowing through a tube into lime water, made by pouring water upon common quicklime and allowing it to settle and become clear. The carbonic acid unites with the lime, and the clear lime water becomes in a few moments quite milky, owing to the formation of carbonate of lime.

2. Another source from whence carbonic acid is derived in immense quantities, is ordinary combustion. All combustible bodies used for fires, produce this gas while burning. Carbon, in one form or another, is the leading combustible substance in all kinds of fuel, in wood, coal, charcoal, oil, resin, pitch, turpentine, etc. While burning, the carbon unites with oxygen, and becomes carbonic acid. Whenever, then, combustion is going on, this gas is largely produced. *a.* An instance is to be seen in the practice of suicide by means of burning charcoal. In France, particularly, the misguided and wicked persons who thus rashly desire to take away their own lives, light a pan of charcoal and shut themselves up with it in a close room. The carbonic acid produced soon fills the room, and in a short time destroys life. *b.* It is easy to see that combustion must annually send vast quantities of this gas into the atmosphere. Particularly is this true in cold climates, where, during winter, fires are so numerous and constant.

3. In some districts large quantities of carbonic acid pass off into the air from fissures in the earth's surface: this is no doubt produced by volcanic action at a great depth.

4. Another source is natural decay and decomposition It is a curious fact, that if you leave a piece of wood to decay, the ultimate results will be the same as if it had been burned in the commencement. The action is slower, requiring often years to complete it; but the products are the same, that is, carbonic acid and water. Decay has, for this reason, been called a slow combustion.

We see, therefore, that the constant tendency in every species of destruction, decomposition, or decay in animal and vegetable bodies, is to the production and liberation of carbonic acid. The sources already indicated are quite sufficient to supply the quantities annually withdrawn from the atmosphere by vegetation.

The *hydrogen* required by plants is readily obtained. Water consists of hydrogen and oxygen: in the form of a liquid, it is drawn up by the roots; as a vapor, it is absorbed by the leaves from the atmosphere. This may be seen in the great effect of a trifling shower during dry weather. Even if there is only enough rain to barely moisten the sur-

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face of the parched earth, the leaves before drooping are revived, and the whole plant assumes a flourishing appearance; no water has reached its roots, but it has absorbed a portion of the shower through its leaves. This one source of supply affords ample store of hydrogen.

Oxygen is also to be obtained by the plant from water. Carbonic acid too, it will be remembered, is partly composed of this gas. There can thus be no difficulty as to the plant's obtaining oxygen, and no fear of exhausting it from the atmosphere.

The source of the *nitrogen* in plants is not so clear. We know that four-fifths of the air surrounding all plants is nitrogen, and yet it is proved that but little if any of this nitrogen is absorbed through their leaves; neither can it be shown to enter in any quantity through their roots. We find, however, that the soil is the place from which it comes, but that it is always in some form chemically united with other bodies. The two substances, ammonia, and nitric acid, described under a previous head as containing nitrogen, are the chief sources of supply to plants; this fact partly explains their great efficacy as manures. They are both present in fertile soils, sometimes the one and sometimes the other in largest quantity. Both are soluble in water, and therefore can without difficulty enter the roots.

It will now be easily perceived that these organic bodies to which attention has been so frequently called, are indeed of very great importance. They constitute the great bulk of vegetable life in all of its forms. In the air and the soil, they are indispensable to life. We cannot see them, yet depend on them for existence itself. If half of the $\frac{1}{2500}$th of carbonic acid present in the atmosphere were withdrawn, nearly all valuable plants would cease to flourish, and as a consequence animal life too would gradually become extinct.

THE SOIL.

THE PROPORTION AND ORIGIN OF THE ORGANIC MATTER IN THE SOIL.

Having now become familiar with the substances which are found in both the organic and the inorganic parts of plants, we must next inquire what is the connection between the plant and the soil. We find that one soil produces better crops than another; that plants will grow in some places that will not flourish at all in others; that manure is not needed on some soils while it is quite indispensable on others. The reasons for these and many other differences that might be mentioned, are only to be discovered by chemical analyses of the soil itself.

The first point which we are able to establish, is the fact that here, as in the plant, are to be found the two great classes of organic and in-

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organic substances. If a portion of soil is heated on a knife blade, or a thin iron or tin plate, it will smoke and blacken; if the heat be continued the smoke will after a time cease, the blackness disappear, and the remaining earth will be usually of a whitish or reddish color. It is like the ash left behind on burning wood or straw, excepting that there is far more of it.

The ash from plants, it will be remembered, is but a small proportion of their weight, one to fourteen lbs. in a hundred; in soils the incombustible part is usually more than ninety lbs. in a hundred, frequently ninety-five. In some peaty or rich forest lands, indeed the organic part is largest; but, as all know, these constitute but a small proportion of our ordinary soils. This organic matter was not originally present in the soil: it has all accumulated there by the death and decay of plants and animals. The first soil, formed by the crumbling and decomposition of the bare rock, must have been entirely destitute of this part. Some species of living things, however, existed even there, some forms of vegetation and of animal life; as these died, they mingled with the broken down rocks, and became food for new plants of higher orders; thus their remains gradually gathered, until the result was our present surface soils.

Fertile soils always contain a considerable proportion of this organic matter. There is no rule as to the quantity that should be present: we find them very fertile, containing all the way from two to fifty per cent, and even upward; though it may be said that permanently rich strong soils seldom contain less than from five to ten per cent.

When there is more than fifty per cent, and the soil is moist, an injurious effect is produced, the soil becoming what is called sour: nothing but poor wiry grass will grow. The reasons of and the remedy for the result, will be considered subsequently.*

Having explained the origin of this organic matter, it is only necessary to mention briefly, that it is composed of the same four organic substances previously named, Carbon, Hydrogen, Nitrogen, Oxygen.

NECESSITY FOR ORGANIC MATTER IN THE SOIL, AND ITS LIABILITY TO EXHAUSTION.

This part is necessary in the soil for several reasons.

1. It enables the land, if light and sandy, to retain moisture, and also to retain manures much longer than it otherwise would; to stiff and clayey soils it gives mellowness and lightness.

*I have said that there is no rule as to the precise quantity of organic matter that ought to be present, that is within 5 to 40 or 50 per cent. Other things being equal, the soil with 30 or 40 per cent seems to be in no way superior to that which only has 4 to 5 per cent. Thus we cannot speak definitely as to any necessary proportion.

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2. Another important effect in cold climates, is the darker color which it imparts to the surface. A dark colored soil absorbs more heat than a light one, being consequently warmer and earlier. This is seen in the fact that snow melts sooner from the plowed field than from the meadow in similar situations, from the dark garden bed than from the gravelled walk.

3. Besides these useful purposes, there is no doubt that the organic part of the soil in a greater or less degree, ministers food directly to the plant through its roots. The supply obtained in this way varies with the situation, but is of much importance to plants, as shown by their increased luxuriance when it is furnished them in a soil previously deficient.

This consumption of organic matter by plants to form their own bulk, shows how it is that land long cultivated and scantily manured, at last becomes very poor in this part. Each crop has carried away a portion of it, more than has been returned in the small quantity of manure applied. Another way in which this is exhausted, is by frequent plowing and stirring, whereby it is exposed to the air, and consequently decomposes rapidly. If you long bury straw or other organic matter deep under the surface, so as to be excluded from the air, it will remain almost unchanged for years; but as soon as you bring it toward the surface, where the air can obtain access, decay commences.

There are then two ways in which this disappearance of organic substances goes on in the soil: first, as it is used for the food of plants; second, as it is decomposed by being brought in contact with air.

From what has now been stated, it is obviously for the interest of the farmer to keep up the supply of organic matter in his soil: an equivalent at least for every thing taken off, should, as far as possible, be returned in the shape of manure; peat and composts are good forms of adding large quantities.

But the best way of all when the land is run down, is to cultivate green crops for plowing under; such as clover, buckwheat, vetches, etc., etc. *a.* Though plants draw much of their organic part from the soil, yet the greater proportion comes from the air through the leaves; consequently when a crop of clover is plowed in, there is, in addition to what it has taken from the soil, much more than half its weight which came from the air, and is therefore a clear gain to the soil. In this way the organic matter may be increased, and even the poorest land be gradually brought up to a state of fertility. *b.* Every good farmer should watch his fields carefully, and see that they do not become deficient in this very important part. Whenever or wherever we see

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land losing it from year to year, it is certain that there is bad management somewhere.

The farmer must not suppose that by this or any other system he can bring up his worn out land in one or two years: the progress of improvement will be gradual. He must persevere in the use of green crops, bringing them in frequently, and returning at the same time in the shape of manure, as much as may be of the other crops taken off. Above all he must not, as soon as his land is so far recovered that his clover or other green crop begins to be heavy, yield to any temptation to cut it off; for this is returning to the old system of exhaustion. The object should be to keep the land steadily improving; and to that, for the few first years, all other considerations should give way. When it is fully established as a fertile and well stocked soil, constant watchfulness will keep it in that condition without much expense; and the farmer will soon find that it is far cheaper to cultivate good land and keep it good, than to live on a farm where every thing is taken out and nothing put in.

OF THE DERIVATION OF SOILS, AND THEIR CLASSIFICATION.

I have already said that the mineral part of soils is derived from the decomposition or crumbling down of the solid rocks. In every neighborhood may be seen instances of this crumbling down: with some rocks, as granite, it is very slow, scarcely perceptible from one year to another; with others it is more rapid, as some sandstones and limestones; with others still almost immediate, as some slates, which fall to pieces whenever they are brought to the surface. However quickly or slowly this crumbling takes place, a soil is at last made, and of course resembles in its composition that of the rock from which it was formed.

The greater part of the rocks which appear on the surface of our earth, are varieties of sandstones, limestones, or clays, or mixtures of the three.*

1. Sandstone is often known as freestone, and is common in many parts of this country, being a valuable building material. Our light sandy soils were nearly all originally formed from this rock. Many of these are very poor; but there are some sandstones which make most excellent soils, as rich as any that are cultivated. In particular cases they contain so much lime as to be nearly marls, and then form very fertile soils. Very many sandstones crumble away quite readily, some

* This is a popular and not strictly scientific classification, and is to be considered only as a general description.

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showing the action of the atmosphere almost immediately upon exposure. For this reason the soils are ordinarily of good depth.

2. Limestone is also common, and there are few places where a teacher cannot find some to exhibit to his scholars. It is found of all colors from white to black, and makes a great variety of soils. As a general rule these soils are good, and capable of bearing very excellent crops. There is much variation among the limestones as to ease of decomposition. Many of them form a deep soil very soon, but there are some of the blue mountain limestones which decompose with exceeding slowness. On these the soil is thin, but usually of rather good quality, especially for pastures.

3. Clay is the principal ingredient in roofing slate, in school slates, and in what are called *shales*. Beside this, as is well known, it exists in large beds, from which are made pipes, bricks, tiles, etc., etc. Whenever it occurs largely in soils, they are stiff, tenacious, and nearly impervious to moisture. In consequence water remains on the surface, and makes them wet, difficult to plow, and hard to cultivate in any way. They are, however, usually of good quality, and by proper skill may be made most valuable.

Some writers have classified soils, according as they contained more or less of one of these. First would be a sand, then a sandy loam, then a clay loam, a stiff clay, and finally a brick or pipe clay, the last being too stiff for cultivation. Soils in which lime existed largely, would be called calcareous. Where there was more than 20 to 25 per cent, it would be a marl. Some definite rules of this kind might prove quite useful to farmers in describing soils.

Prof. Johnston has proposed the following:

1. Pure clay, such as pipe clay or porcelain clay; from this no sand can be removed by washing.
2. Strong clay, brick clay, contains from 5 to 20 per cent of silicious sand.
3. Clay loam has from 20 to 40 per cent of fine sand.
4. A loam, has from 40 to 70 per cent of sand.
5. A sandy loam, has from 70 to 90 per cent.
6. A light sand has less than 10 per cent of clay.

This classification may easily be made by means of simple washing. The soil should first be dried, and then after boiling in water should be thoroughly stirred in some convenient vessel. The sand will settle first and when it is at the bottom, the liquid above, holding the fine clay, etc. in suspension may be poured off; when this has been done a few times, nothing will remain at the bottom of the vessel, beside nearly pure sand;

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this may be dried and weighed, and the quantity will indicate to which class of the above the soil belongs.

It is always possible to ascertain if there be much lime in the soil, by adding a little muriatic acid, such as may be obtained at any apothecary's. This acid, as soon as it comes in contact with the lime, if there be any, causes a brisk effervescence, owing to the bubblings up and escape of carbonic acid gas, which is expelled from its combination with lime by a stronger acid. It is easy in this way to ascertain if any specimen of earth is a marl or not. Such a simple test would often save the farmer much trouble and expense, by preventing him from applying useless material to his soil for the purpose of fertilizing it. The distinctions between light and heavy soils, so common among farmers, all arise from the different proportions of sand and clay which the various soils contain.

The light soils are most easily and cheaply cultivated, and are found to be particularly well adapted to the growing of some crops, such as barley, rye, buckwheat, etc. They are porous, and for that reason generally dry.

The heavier soils require more skill and caution in their cultivation, but are not so easily exhausted as the others; they are particularly adapted to growing wheat, oats, indian corn, etc. Very heavy soils are exceedingly liable to wetness, and can only be made dry by draining.

NUMBER OF INORGANIC SUBSTANCES IN SOIL. REASONS FOR FERTILITY OR BARRENNESS.

It has been said that soils are chiefly made up of three substances, lime, sand (silica), and clay (alumina). But besides these, chemical analysis finds smaller quantities of some seven or eight other bodies. In the first column of the following table, representing the composition of three different soils, are to be seen the names of these.

TABLE FIRST.

In one hundred pounds.	Soil fertile without manure.	Fertile with manure.	Very barren.
Organic matter,	9.7	5.0	4.0
Silica,	64.8	83.3	77.8
Alumina,	5.7	5.1	9.1
Lime,	5.9	1.8	.4
Magnesia,	.9	.8	.1
Oxide of iron,	6.1	3.0	8.1
Oxide of Manganese,	.1	.3	.1
Potash,	.2	....	....

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In one hundred pounds.	Soil fertile without manure.	Fertile with manure.	Very barren.
Soda,	.4	....	....
Chlorine,	.2	....	....
Sulphuric acid,	.2	.1	....
Phosphoric acid,	.4	.2	....
Carbonic acid,	4.0	.4	....
Loss during the analysis,	1.4	....	.4
	100.0	100.0	100.0

It will at once be noticed, that these are the very substances which were named and described when we were upon the inorganic part, or ash, of plants. To this coincidence I shall hereafter refer.

At the head of the first column is named organic matter; this has already been disposed of. The other substances making up the inorganic part, follow in different proportions, the silica being largest. It will be seen that these three soils are different in their qualities, one being fertile without manure, another fertile with the addition of manure, and last quite barren. Every one at all conversant with agriculture, knows that these differences in soils actually exist. We find occasionally, though not often, tracts of large extent, where the most exhausting crops may be grown for many years in succession without the aid of manure, their power of production not seeming to decrease even under such severe cultivation. Now wherever we discover such soils, whether in our own western States, whether on the banks of the Nile or Ganges, in whatever part of the world they may be located, a chemical examination will invariably show the presence of all the substances above named. It is not necessary that they should be in precisely the quantities named here, but they must all be present. The proportions of some of these may seem so small as to be unimportant; that they are not, will appear when we consider how many hundred pounds there are in an acre of soil twelve inches deep. The smallest of the above proportions would, for an acre, amount to several tons. It would require an immensely heavy manuring to add one half of a per cent of any particular ingredient to the soil.

Unfortunately soils of the first class are not so plenty as those of the second, which bear good crops if an abundance of manure is added. Such are our ordinary soils in all parts of the country. It will be seen that in the column representing the composition of this soil, there are blanks opposite to the potash, soda, and chlorine, denoting that these are absent. Several others, sulphuric and phosphoric acids, and lime, are in much smaller quantities than in the first column.

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In the third column, we find just half of the inorganic bodies present in the first entirely wanting, and two others, lime and magnesia, greatly reduced in their proportion. Any ordinary application of manure would not supply enough to make up all of these deficiencies; and except in places where produce was high and manures cheap, as in the neighborhood of large cities, such land could scarcely be cultivated with profit. We can tell just what is wanting by inspection of the above table; but few farmers could afford to do every thing required for the improvement of such a soil at once. The best way would be to bring it up by plowing in green crops, and thus gradually with a moderate use of manure in addition, form a surface soil. This would, however, be a work calling for the exercise of much patience, perseverance, and good judgment.

The foregoing table shows clearly enough, the differences in soils which cause what we call fertility or barrenness. The explanation is perfectly simple, and perfectly satisfactory, showing as it does that all depends upon the presence or absence of certain substances. This is the general solution, but there are occasionally cases which form exceptions. There are soils which remain barren, even although they contain all of the substances named above, and though much manure is added. This is because their physical structure is wrong, or because some substances are present in hurtful excess. *a.* If the quantities of magnesia, iron, or manganese, be very great, the soil containing them is found to be unpropitious to vegetation, often positively injurious. *b.* There are two oxides of iron occasionally found in the earth. One is the peroxide, or common iron rust; this does not seem to be hurtful, but always beneficial to vegetation. The other is called the protoxide of iron; it contains less oxygen than the peroxide, it is also more soluble, and is, where it exists in considerable quantity, fatal to most plants and trees.

A barren soil, then, is barren because some substances are too largely present, or because certain substances are wanting. Chemistry is quite competent to point out the difficulty in either case, and also to say what would be the remedy. We can tell what is necessary to fertilize the most hopeless desert, but at the same time may not be able to conduct the operation so as to make it profitable. It becomes no longer a question of knowledge, it is one of expense. We know what to do, but may not in all cases be able to do it with a profit, and this with a practical man is always an important distinction.

It will be noticed in table first, that alumina, a substance rarely, if ever, present in the ash of plants, is quite an abundant constituent of

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soils. This is one distinction between the inorganic part of plants and that of the soil, alumina being a characteristic of the one and absent from the other. In nearly all soils, silica is the leading substance, usually constituting fully two-thirds of their whole weight, and often eighty or ninety pounds in every hundred. The only cases in which it is not largely present are those of the peat bogs, made up almost entirely of vegetable matter. Silica forms compounds with certain of the other bodies in the soil, making what are called soluble silicates. The gradual formation of these compounds affords a supply for the plant.

We have now mentioned the substances which are present in the soil, and have previously dwelt upon those which constitute the plant. Sundry points of connection between the two, will already have suggested themselves to the reader or student. To these we must next turn our attention, in treating of the various methods proper to be employed in bringing soils to a state of fertility, and to a condition the most easy and profitable for cultivation.

From examining table first, and from the explanations already given, it will be perceived that there are various points to be considered in attempting the improvement of the soil. *a*. If there be a chemical deficiency, that is an absence of certain constituents necessary to fertility, as mentioned above, then but one course can be adopted with any hope of success; this course is obviously to supply what is wanting. The ways of doing this in the most advantageous and economical manner, will be considered under what may be called chemical improvements, or the use of manures. *b*. If there be a physical defect, if the land is too wet, too light, too stiff, or if from either of these causes it abounds in noxious compounds, the remedies come more properly under what may be called mechanical improvements. This branch of the subject will first attract our attention, and will next be considered.

THE SOIL (CONTINUED), AND SOME OF ITS CONNECTIONS WITH THE PLANT.

WHAT THE CONDITION OF THE SOIL SHOULD BE, AND THE NATURE OF MECHANICAL IMPROVEMENT.

We are now able to say that a fertile soil should have all of the substances which were mentioned in Table I., and were also named when giving the composition of the plant. These substances should be present in abundance, and yet none of them in too large quantity; they should be in forms best adapted to the nourishment of plants, and the physical character of the soil should be such that the plants could easi-

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ly penetrate in every direction with their roots to obtain them. Air and warmth should also pervade every part, because under their influence the plant flourishes better, and the necessary changes in the composition of the soil take place more readily. To bring about these conditions is a study for the farmer, and the latter of them come appropriately under our present head.

By mechanical improvement of the soil, I mean the improvement of its texture, and of its other qualities, by means not connected immediately with alteration of its chemical composition. They bring on chemical changes, it is true, but still the operations themselves are purely mechanical. Some soils for instance, are too light, and others too stiff and heavy. There are various ways of removing these defects.

a. In situations where clay can be obtained, it is found to be the most valuable possible application for light soils; it consolidates them, causes them to retain water and manure, and for the objects of permanent improvement is worth more, load for load, than manure.

b. Upon very heavy clay lands, on the contrary, sand is laid in large quantities with equal success. Here the effect is the reverse of that desired on light sands. The clay is mellowed, made less retentive, dries sooner in spring, and does not bake so hard in summer. Such operations as these, in favorable situations, are very profitable; and although expensive at first, are in the end far cheaper than manuring in the ordinary way.

THE EFFECTS OF TOO MUCH MOISTURE IN THE SOIL.

I come now to mention a defect in soils which is of very great importance, and which has not as yet been fully appreciated in this country. This is the presence of too much moisture. Wherever water is so abundant in the soil as to completely saturate it, various evil effects take place.

a. The necessary decomposition of organic substances is arrested, and certain vegetable acids are formed, called by chemists *humic*, *ulmic*, *geic acids*, etc. In swamps and low grounds generally, these accumulate to a large extent, and form the deep black soil or muck of such situations.

b. So long as these acids are present in such excessive quantity, valuable plants refuse to grow; but, as is well known, when the muck is taken out and dried, it becomes a valuable manure; this is because air and warmth obtain access, and the process of decomposition goes on again. In order to avoid misapprehension, it ought here to be mentioned that these acids in small proportions are really useful in the soil,

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as furnishing a portion of their food to plants. It is the excess of them that does so much injury.

It is not only in swamps that this injurious formation occurs: there is much land which is too wet in the early part of the season, or in which are springs that saturate the surface; this land may be hard, and may even bear plowing, yet still it is what farmers call *cold* and *sour*. These are exactly the proper words, for they truly express its qualities. Considerable and injurious quantities of these vegetable acids are formed; and the water, by constant evaporation from the surface, produces cold; the grass is scanty and poor, while rushes show themselves in the wettest spots. There are large tracts of such land as this in almost every part of the country. Farmers think such land too dry for draining, and yet that is the only way to make any permanent improvement upon it. It is cold and late in spring, apt to bake hard in summer, and to suffer from early frosts in autumn. It is not in a fit condition to support good crops, and the only way to bring it into a good state is to dry it.

Some land is dry on the surface, but has a wet sub-soil: when the roots of the plants get down to this, they find at once injurious food, not only the acids already mentioned, but inorganic substances; the protoxide of iron described (ante 642) is very apt to form in such places, and is at once fatal if the plant can find no nutriment in other directions. In this case too the only remedy is to drain. The good effects of this operation on all soils suffering from any of the causes above mentioned, are very remarkable, and must briefly be specified before going farther.

ON THE CHANGES WHICH RESULT FROM DRAINING.

When the drain is made and covered, (for I always mean here *covered* drains,) the water which falls upon the ground does not remain to stagnate, and does not run away over the surface, washing off the best of the soil, but sinks gradually down, yielding to the roots of plants any fertilizing matter which it may contain, and often washing out some hurtful substances; as it descends, air, and consequently warmth follow it. Under these new influences the proper decompositions and preparation of compounds fit for the sustenance of plants go on, the soil is warm and sufficiently dry, and plants flourish which formerly never would grow on it in perfection if at all. It is a curious fact, too, that such soils resist drought better than ever before. The reason is, that the plants are able to send their roots much farther down in search of food, without ever finding anything hurtful. Every part being pene-

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trated with air, and consequently drier and lighter, these soils do not bake in summer, but remain mellow and porous. Such effects cannot, in their full extent, be looked for in a stiff clay during the first season; the change must be gradual, but it is sure.

ON THE CONSTRUCTION OF DRAINS, AND THE MATERIALS USED.

These being the benefits that are to be expected from the introduction of drains into swampy and wet land of every description, it is obviously important to know how they should be made. With the exception perhaps, of large main channels, to which all others converge, or for carrying off small rivulets, the drains should be covered. Open drains occupy much of the land by their bulk, and cannot be approached very closely by teams on either side; they thus cause a farther loss of land, beside great inconvenience in working. Their banks and sides are nurseries of weeds, so that unless regularly cleared out, they are extremely liable to become choked, and thus fail to do their work properly. Another great evil is, that when water falls upon the land, instead of sinking through to the subsoil, it runs away over the surface; washing off fertilizing substances from the richest part of the soil, and carrying them away.

For these reasons, covered drains are always to be preferred in situations where it is practicable to make them. There are several points of much importance in the construction of such drains.

First as to their depth; where a fall can be obtained, this should be from 30 to 36 inches. The plants could then send their roots down and find to this depth a soil free from hurtful substances. The roots of ordinary crops often go down three feet, when there is nothing unwholesome to prevent their descent. The farmer who has a soil available for his crops to such a depth, cannot exhaust it so soon as one where they have to depend on a few inches, or even a foot of surface. Manures, also, cannot easily sink down beyond the reach of plants. On such a soil, too, deep plowing could be practised, without fear of disturbing the top of the drains. The farmer should not, by making his drains shallow, deprive himself of the power to use the subsoil plow, or other improved implements that may be invented, for the purpose of deepening the soil. There are districts in England, where drains have had to be taken up and relaid deeper for this very reason. It would have been an actual saving to have laid them deep enough at the first.

Second, as to the way in which they should be made, and the materials to be used.

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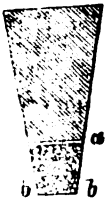
a. The ditch should of course be wedge-shaped for convenience of digging, and should be smooth on the bottom.

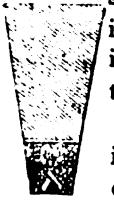
b. Where stones are used, the proper width is about six inches at the bottom. Small stones should be selected, or large ones broken to about the size of a hen's egg, and the ditch filled in with these to a depth of nine or ten inches. The earth is apt to fall into the cavities among larger stones, and mice or rats make their burrows there: in either case water finds its way from above, and washes in dirt and mud, soon causing the drain to choke. With small stones, choking from either of these causes cannot take place if a good turf be laid grass side down above the stones, and the earth then trampled in hard. Cypress or cedar shavings are sometimes used, but are not quite so safe as a good sound turf. The water should find its way into the drain from the sides and not from the top.

Fig. 3.



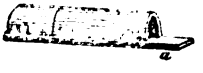
The accompanying figure represents the arrangement of the stones: *a* is the turf on top; if the water enters at the sides *b*, *b*, it comes in clear, having filtered through the soil, and deposited every thing in the way of mud which might tend to choke the drain. Some farmers prefer to make stone drains like fig. 4, having two flat stones laid against each each other at the bottom so as to form a sort of pipe, and filling above them with small stones as before. In very swampy soft ground, it is sometimes necessary to lay a plank or slab in the bottom of the drain, before putting in the stones. This is to prevent them from sinking, and making an uneven bottom, before the soil becomes dry enough to be firm.

Fig. 4.



Stones broken to the size above mentioned are expensive in this country, and in many places they cannot be procured; in England it is now found that tiles made of clay and burned, are cheapest. These have been made of various shapes.

Fig. 5.



a. The first used was the horse-shoe tile, fig. 5. This was so named from its shape: it had a sole made as a separate piece to place under it, and form a smooth surface for the water to run over.

b. Within a few years this tile has been almost entirely superseded by the pipe tiles; these are made of several shapes, as seen in the accompanying figures 6 and 7: the oval shape (fig. 7,) is advantageous, because a small stream in the bottom will wash out every obstruction that can be carried away by water. These tiles have a great advan-

Fig. 6.

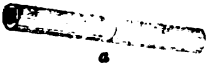
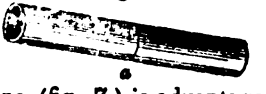


Fig. 7.



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age over the horseshoe shape, in that they are smaller, and are all in one piece; this makes them cheaper in the first cost, and also more economical in the transportation.

All these varieties are laid in the bottom of the ditch, it having been previously made quite smooth and straight. They are simply placed end to end, as at *a*, *a*, in figures 6 and 7; then wedged a little with small stones if necessary, and the earth packed hard over them. Water will always find its way through the joints. Such pipes laid at a depth of 2½ to 3 feet, and at proper distances between the drains, will in time dry the stiffest clays. Many farmers have thought that water would not find its way in, but experience will soon show them that they *can not keep it out*. The portion of earth next the drain first dries; as it shrinks on drying, little cracks begin to radiate in every direction, and to spread until at last they have penetrated through the whole mass of soil that is within the influence of the drain, making it all, after a season or two, light, mellow, and wholesome for plants.

The appearance of tile drains in the earth is shown by fig. 8, representing a cross section. They form a connected tube through which water runs with great freedom, even if the fall is very slight. When carelaid, they will discharge water where the fall is not more than two or three inches per mile. If buried at a good depth, they can scarcely be broken; and if well baked, are not liable to moulder away. There seems no reason why well made drains of this kind should not last for a century. The pipe tiles are used of from 1 to 1½ inches diameter of bore for the smaller drains, and for the larger up as high as 4 or 5 inches. They are all made in pieces of from 12 to 14 inches in length. An inch pipe will discharge an immense quantity of water, and is quite sufficient for most situations. These small drains should not ordinarily be carried more than 400 or 500 feet before they pass into a larger one, running across their ends. Where a very great quantity of water is to be discharged, two large-sized horse-shoe tiles are often employed, one inverted against the other, as in fig. 9.

Fig. 8.

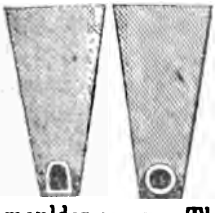

Fig. 9.

Third, as to the direction in which the drains should run. The old fashion was to carry them around the slopes, so as to *cut off* the springs; but it is now found most efficacious to run them *straight down*, at regular distances apart, according to the abundance of water and the nature of the soil. From 20 to 50 feet between them, would probably be the

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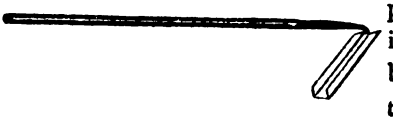
limits for most cases. It is sometimes necessary to make a little cross drain, to carry away the water from some strong spring. In all ordinary cases, the drains running straight down, and discharging into a main cross drain at the foot, are amply sufficient.

Tile machines are now introduced into this country, and tiles will soon come into extensive use. Their easy portability, their permanency when laid down, and the perfection of their work, will recommend them for general adoption. It is also to be noticed that it takes less time to lay them than stones, and that the ditch required for their reception is smaller and narrower. The bottom of it need only be wide enough to receive the tiles. The upper part of the earth is taken out with a common spade, and the lower part with one made quite narrow for the purpose, being only about four inches wide at the point. The bottom is finished clean and smooth, with a peculiar hoe or scoop (fig. 10.) This is necessary, because the tiles must be laid on an even smooth foundation.

Fig. 10.



ON SUBSOIL AND TRENCH PLOWING.

In connection with draining, must be noticed another mode of mechanical improvement; this is subsoil plowing. The subsoil plow is an implement contrived to stir up and loosen the lower soil, without bringing it to the surface. It follows the furrow of an ordinary plow, and goes down as deep as it can be forced, in some cases from 20 to 22 inches. The subsoil is thus broken and mellowed, air finds entrance, injurious substances are washed down lower, or, if there are drains, carried away, and the whole soil to a greatly increased depth is fitted for the sustenance of plants. It should be repeated once in five or six years. It is difficult to go down more than a few inches below the old furrow at the first subsoiling; at the second, one or two more can be gained, and so on till the greatest possible depth is attained. In some parts of England they dig over the whole soil as deep as two feet, but that is too expensive an operation for most parts of this country.

Trench plowing is also practised in certain situations. A very heavy plow is used, of the same shape as the ordinary plow, but much heavier; this brings the lower soil to the surface. Such an operation is only to be advised when the subsoil is of good quality, as otherwise the poor earth would be left on the top, and the richer surface soil buried deep beneath it.

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ON THE RELATIONS BETWEEN THE SOIL AND THE PLANT.

We now come to a new department of our subject, in considering the connection which exists between the soil and the plant. The attentive reader will already have perceived that the inorganic substances in both, show a certain marked coincidence. The source of the organic part in plants has before been shown to be partly the soil and partly the air. The inorganic substances can of course only come from the soil, and thus it is at once easy to perceive why the differences indicated by Table I, constitute fertility or barrenness. It is because the *plant* needs these substances, that their absence is so destructive to the value of a *soil*.

They all enter through the roots, having always been previously dissolved in water. If they were received in fine solid particles, the ash of any particular plant would be different according to the differences in various soils; but this is not found to be the case, as each plant has a peculiar ash of its own.

a. Experiments have been made by preparing six different plots of ground in the same manner, and then mixing with one alumina, with another lime, with another soda, with another magnesia, and so on; all of these substances being reduced to a very fine powder. The result was that the ash in the same plants grown on all these plots, was nearly identical in composition; thus showing that they did not take in every thing in the shape of fine particles that came in contact with their roots, but received their food in solution, and even then only such as suited their particular wants.

It may be best here to explain that a substance spoken of as in solution is dissolved, according to the common acceptance of the word, just as sugar or salt is dissolved in water.

The fertile soil then must contain all of these inorganic substances, because plants will not flourish without them. *a*. Alumina does not enter into plants to any appreciable extent, but is necessary to them for reasons which have been mentioned when referring to the stiffness and physical structure of the soil. *b*. Manganese cannot be considered indispensable to the ordinary crops, but there are some classes of trees which appear to require it in considerable quantities. The others on the list are found in all cultivated crops. The following table gives instances in three common ones: the analyses were made in Germany.

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TABLE II.

In one hundred lbs. of ash.	Peas.	Field Beans.	Wheat.
Silica,	0.56	1.48	1.92
Iron,	0.68	0.34	0.53
Lime,	2.96	5.38	3.02
Magnesia,	7.75	7.35	13.58
Phosphoric acid,	38.34	35.33	45.44
Sulphuric acid,	2.63	2.28	.....
Potash,	27.12	21.71	24.18
Soda,	17.43	21.07	10.34
Chloride of sodium,	1.88	3.32	.....
	99.35	98.26	99.01

There is a little loss in each analysis, as is almost invariably the case in practice.

a. It will be seen from this table, that with the exception of the two substances above mentioned, alumina and manganese, all of the others named in Table I. are also present here. In subsequent tables, I shall have occasion to present the composition of ash from other crops, and it will be found that in these also they are, as a general rule, all mentioned.

b. Other facts are indicated by this table, which are of much importance: it will be noticed that the ash of these seeds varies considerably in composition. In beans and peas, for instance, the quantity of potash and soda is much greater than in wheat, while on the other hand wheat contains most phosphoric acid: these points will be alluded to again.

Some of the substances named in the table, as lime and magnesia, are in small quantity. Suppose 60 bushels of beans to the acre, a very large crop, weighing 60 lbs. per bushel, and making a total weight of 3,600 lbs. Each 100 lbs. would yield about 2 lbs. of ash; at that rate, the amount of ash taken from an acre would be 72 lbs. Of this only about 9 lbs., according to the above table, would be lime and magnesia; about 35 lbs. would be potash and soda. The whole quantity, 72 lbs., seems small when taken from an acre, and either of the above portions of it appear almost unworthy of notice; yet it is found by experience, that if the crops are unable to obtain these small and comparatively seeming unimportant parts of their whole bulk from the soil, they absolutely refuse to flourish. The farmer may furnish other manures as abundantly as he pleases, but if they do not in some form or other contain these missing ingredients, the plant cannot be forced to grow thriftily or yield abundantly. The appearance of his field will say as plainly

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as words could express it, that something is needed which he has not given. How many crops thus demanding food from their owners, do we see in almost every neighborhood! Should not the farmer of whom such a demand is made, exert himself to supply what is wanted; and if he does not already know, to gain the necessary knowledge?

Several points are established by such a table as the foregoing, and these may with advantage be briefly recapitulated:

1. Our cultivated plants require that all of the inorganic substances present in Table I. shall exist in the soil.

2. They do not require them in the same proportion, the different plants differing in the composition of their ash.

3. This composition of the ash is not accidental, but each plant has a distinct character of its own.

4. It is thus rendered obvious that land which would grow one crop well, might not be able to grow another having a different composition. A crop requiring little potash, for instance, might flourish luxuriantly where one requiring much of this substance would fail. To the principle thus indicated, we propose to return hereafter.

EFFECT OF CROPPING UPON THE SOIL. ROTATION OF CROPS.

ON THE COMPOSITION OF THE ASH FROM OUR COMMON CROPS.

We are now able to understand the effect of constant cultivation upon the soil. This might, indeed, to a certain extent, be gathered from what has already been said; it is necessary, however, that the sketch of such an important part of the subject should be made perfectly clear and precise. The student will by this time know, that as the inorganic part in the seed of the plant consists mostly of those constituents which were shown by Table I. to be least abundant in the soil, the constant selling off of grain must in time very materially decrease the stock of such substances, unless the supply is kept up by the addition of manures. If the soil was very rich at the commencement, exhaustion might be quite slow; but if the stock of fertility was small, it would soon reach the utterly exhausted and worn-out condition in which we see so many of our farms. This and other points will be made more clear, by a table giving the composition of our most common cultivated crops.

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TABLE III.

	Indian corn.	Wheat.	Wheat straw.	Rye.	Oats.	Potatoes.	Turnips.	Hay.
Carbonic acid,.....	trace.	.....	.....	.....	.....	10.4	.....	.....
Sulphuric acid,....	0.5	1.0	1.0	1.5	10.5	7.1	13.6	2.7
Phosphoric acid,..	49.2	47.0	3.1	47.3	43.8	11.3	7.6	6.0
Chlorine.....	0.3	trace.	0.6	.....	0.3	2.7	3.5	2.6
Lime,.....	0.1	2.9	8.5	2.9	4.9	1.8	13.6	22.9
Magnesia, ...	17.5	15.9	5.0	10.1	9.9	5.4	5.3	5.7
Potash, ...	23.2	29.5	7.2	32.8	27.2	51.5	42.0	18.2
Soda,.....	3.8	trace.	0.3	4.4		trace.	5.2	2.3
Silica, ...	0.8	1.3	67.6	0.2	2.7	8.6	7.9	37.9
Iron, ...	0.1	trace.	1.0	0.8	0.4	0.5	1.3	1.7
Charcoal in ash and loss,.....	4.5	2.4	5.7	.....	0.3	0.7	.....	.....
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

These do not represent the *exact* composition of the ash from the above crops, in all cases, but should be considered only approximations. In different situations, there is frequently a considerable variation in composition; this does not, however, affect the general character, where the soil contains a full supply of necessary substances. The ash from healthy potatoes, for instance, never resembles that from a flourishing crop of wheat. The table then may be regarded as approaching sufficiently near the truth for all practical purposes.

ON THE SEPARATION OF PLANTS INTO CLASSES, ACCORDING TO THE COMPOSITION OF THEIR ASH.

I have inserted in comparison with the grain of wheat, an analysis of ash from the straw also, as an illustration of the difference in the substances which they respectively draw from the soil.

a. It will be noticed that in the ash from the grain, phosphoric acid is the chief ingredient, making up nearly half: potash also is in large quantity, being about one-third. In the straw ash there is but 3 per cent. of phosphoric acid, and only 10 per cent. of potash; magnesia is also much less.

b. In the grain there is not quite 1¼ per cent. of silica, but in the straw, there is nearly 70 per cent. Silica, then, is the leading ingredient in the ash of the straw, phosphoric acid in that of the grain. It is silica which gives the straw its stiffness, strength, and elasticity; when there is not a sufficient supply of it, the straw cannot uphold the weight of the grain, and falls down or lodges, as the farmers say.

c. The reason why nearly all of the phosphoric acid is found in the grain, will be apparent as we proceed to another part of this treatise. This acid is shown by the table to be more abundant than anything else in the ash of rye and oats: the same thing is true of barley and

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buckwheat. In the straw of all these, there is also a preponderance of silica. In the grain of indian corn, phosphoric acid is very abundant, but there is not so much silica in the stalk as in the straw of grain.

The ash from all of these grains differs from the ash of potatoes and turnips in one essential particular: in the two last, phosphoric acid is comparatively a small quantity, being only about one-tenth; here, on the contrary, we find that potash is the most abundant substance of all, particularly in potatoes, where it is a little more than half of the whole. In the ash of both potato and turnip tops, lime also abounds, and often phosphoric acid. Potash and soda too are here among the most prominent ingredients.

If now we look at the ash of meadow hay, we perceive that there is still another difference: potash and soda together are about 20 per cent., phosphoric acid is but 6 per cent., while lime is more abundant than any thing else, with the exception of silica, which last is required to give strength to the stalk as in the straw.

We thus find that there are three great leading classes of ash established: 1. The grains, where phosphoric acid predominates; 2. The roots, where potash and soda abound; 3. The grasses, where lime becomes quite important; 4. The various kinds of straw may perhaps be said to constitute a fourth class, where silica is from one-half to two-thirds of the whole weight; 5. It may be well also to mention a fifth class in trees, the ash from the wood of which contains, in very numerous cases, more of lime than of any other substance. There are particularly large quantities in the apple and other fruit trees.

ON THE EFFECTS OF CROPPING UPON THE SOIL IN CONNECTION WITH SPECIAL MANURING.

In view of these facts, we are now better prepared to consider the effect that cropping has upon the soil. Suppose, in the first place, that as is too often the case, wheat or any other grain has been grown upon a new soil, crop after crop, and nothing returned in the shape of manure; the yield may be good for a number of years, but then it begins to grow less and less; what is the reason of this? It is, probably, that the *phosphates* are nearly exhausted; these were not so abundant as many other substances at the commencement (see Table I.,) but more of them than of anything else has been taken away. Second, suppose that the farmer has sold all of his grain, but has been very careful to return the straw as manure; he does not see why the land should run down, and in fact it does not so quickly now as in the first case; still, after a time, it also begins to show marks of exhaustion. Table III.

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explains this at once; in the straw, he has returned chiefly silica to the soil; it is, however, chiefly phosphoric acid that the grain has taken away, and that he has been selling off.

The same thing would result from exclusive cultivation of any of the other grains. Some soils bear this severe treatment longer than others, but there are very few that would not eventually become exhausted. If turnips or potatoes alone were grown, the loss would be of another description, but equally injurious. In this case, instead of phosphoric acid it is potash and soda that are exhausted, and no amount of phosphoric acid would make good the deficiency. In the case of trees, the demand would more probably be for lime.

The general rule may from all of these facts be considered as established, that cropping tends directly to impoverish the soil. We see by Table I. that silica, alumina, iron and organic matter, in the soils there given, amount to at least 90 lbs. of every 100. In many soils they come up to at least 95 lbs. There is no fear, then, of exhausting the silica; alumina, as has been said, does not enter into the composition of plants, and iron is not usually a prominent constituent. The leading parts of the ash from the grain, the roots, and all of those portions of plants most valuable for food, are found not in the 90 to 95 lbs. made up by these abundant substances, but in the 5 or 10 lbs. necessary to make out the hundred. The quantities of these important substances contained in most soils are therefore small; and hence as they are the very ones most largely carried away, some one of them is usually first exhausted, according to the class of crops that have been chiefly cultivated, as has been heretofore indicated.

When one is gone or reduced to a very small quantity, the crops which particularly require that substance will refuse to grow luxuriantly and to yield well: suppose it to be wheat, and the wanting substance phosphoric acid: there may be the greatest abundance of every other necessary constituent, and yet all of their good effects are more than neutralized by this one defect. By attending to such points as these, the farmer may often save himself much disappointment and expense. He may put on load after load of ordinary manure, and still not produce the desired improvement; when at the same time a bushel or two of some particular ingredient, at one-twentieth of the cost, may have been all that the land wanted.

a. In this way we can explain the wonderful effect often produced by a few bushels of lime, or of plaster. These were just the substances which were deficient in those soils where they proved so efficacious; being supplied, the soils at once became fertile. Where they produce

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no change, as is the case in many situations, it is because there is already a sufficient supply present; because some other substances beside these are also wanting; because the land is too wet, or is otherwise faulty in its physical character; or because injurious compounds are so largely present as to be fatal to the healthy growth of plants.

It is not uncommon for land to be brought up at once by adding a small quantity of plaster, and the application repeated yearly afterward seems to be all that is necessary. This seeming facility of fertilizing his soil, is apt to lead the farmer into a great mistake. He finds that he can obtain heavy crops each year by using a few bushels of plaster or lime, and is tempted to depend almost entirely upon so easy and so cheap a manure, to the neglect of all others. After a time, however, his crops begin to diminish again: he tries increasing the plaster or the lime, but with no renewal of the former effect; he finally resorts to common manure again, but with not even so much success as he formerly had; the land is impoverished beyond anything he has ever known. Thus in some parts of England it has passed into a proverb,

"Lime enriches the fathers, but impoverishes the sons;"

the idea being that the improvement at first is remarkable, but that in the end the land is ruined. Is the blame in such cases to be laid upon either the lime or the plaster? Let us reason a moment upon the facts of the case.

Here was a soil well supplied with all of the substances mentioned in Table I., excepting, by way of example, sulphuric acid and lime (plaster of paris). The farmer adds plaster, which at once supplies the deficiency, and the land produces heavy crops; he adds it the second year with perhaps even increased effect, and so on year after year, until there is as much as is necessary in the soil. Now what is the reason that after a time the crops begin to decrease? There is an abundance of plaster, but may there not be a deficiency of something else? He has been constantly taking off large crops, and carrying them away from the land, with a variety of inorganic substances contained in them. As the crops have been larger than ever before, so the quantities of phosphoric acid, chlorine, magnesia, potash, soda, etc., taken off, have been correspondingly great. How has this constant drain upon the stock of these substances in the soil been met? Why by a constant supply of plaster, that is, of sulphuric acid and lime. At last one or more of them are exhausted; and how is the loss made up? Still by an increased supply of plaster; and because this plaster no longer does any good, it is said that the land has been ruined by its injurious influence.

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From the foregoing explanation, we may easily perceive that it is no longer plaster which the land requires, but perhaps phosphoric acid, potash, magnesia, or some of the other constituents of a fertile soil. They have been taken away, and nothing brought back but plaster; and now that they are exhausted, hundreds of tons of plaster would not make good their loss. It is then the false practice of the farmer, and not the plaster, that has so greatly injured his land. The rule becomes clear and imperative, that every one who uses such special manures to make good a special deficiency, should at the same time keep up the general stock by a liberal use of ordinary manure.

ON THE PRINCIPLES OF ROTATION IN CROPPING.

Nearly all the foregoing statements in this and the preceding division of this essay, have borne more or less distinctly upon the theories or facts connected with the rotation of crops. It may be well to make a few direct applications of the knowledge we have now gained, with this particular subject in view.

All good farmers know that the most exhausting system that can be devised, is to cultivate the same crop on the same soil year after year. When a longer or shorter period has elapsed, as the land may have been at the commencement richer or poorer, the yield begins to decrease; an increase may be obtained again by the free use of manures, but the quantity necessary is so large, and requires to be so often renewed, that it is in most situations more profitable to change the crops, or alternate them.

From such practical observations, have arisen the various systems of rotation that are in vogue in different districts. Table III. shows how practical experience has, in this case, hit upon the very course which science would have recommended. It has been shown by that table, and attention has been called to the fact, that there are several distinct classes of crops, when we consider them with regard to the composition of their ash. The classes are those which are found to bear a part in every good rotation, that is, grain crops, root crops, and grass crops, or the same three classes that were distinguished from each other in the early part of this divison of this essay.

Suppose the farmer to have a soil which requires, as almost all soils do, the aplication of manure to render it fertile. He adds a good coating of manure, and then takes a crop of Indian corn or wheat: this crop will carry away the largest part of the phosphates that were added in the manure; in most cases a second crop of the same kind would not, therefore, be so good, and a third still less. There yet remains, however, from the manure, considerable quantities of other substances,

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which the grain crops did not so particularly require, such as potash and soda; with these a good root crop may be obtained, potatoes or turnips, or beets; after this there is probably still enough lime, etc., left to produce an excellent crop of hay, if seeded down with another grain crop, of a lighter character than Indian corn or wheat.

We perceive then that any good system of rotation must be founded upon the principle, that different classes of crops require different proportions of the various substances that are present in soils, and in the numerous fertilizers that are applied for the purpose of enriching them. Thus the crops may be made to succeed each other with the least possible injury to the soil, and with the greatest economy in the use of manures. It would be useless to recommend here any particular system of rotation as the best; for that is a matter to be decided by experience in each section of country, under the various circumstances of climate, location, and value of certain crops. I wish only to enforce the general principle that rotations are necessary, and that they afford the only means as yet discovered, through which the majority of farmers can regularly obtain heavy crops with profit to themselves; and at the same time can keep up, or even improve the value of their land.

It is to be noticed, that even a good rotation should not be continued too long unchanged upon the same land. After cultivating one grain crop for a very lengthened period in a rotation, it will be found of advantage to make an occasional change to some other. The land appears to grow tired of a crop after a time, and to do better with another even of the same class. There are some districts in Scotland, where clover was for more than a century grown once in five years, their rotations in those districts extending over that space of time; now they can only get it once in ten years, or every other rotation, and that not so good as formerly. They call such land *clover-sick*. Instances of this character show very strongly the value of rotation in cropping, and establish by facts the theoretical view that has been taken of the advantages likely to result from such a system of cultivation. As we come to know more of the composition of our various crops, of the soils, and of manures, we may expect to attain greater exactness in our calculations of the amount taken off during any single year, or during an entire rotation.

In each district, the farmer, by careful observation and study, can after a time mark out the system of cropping and of manuring best adapted to his particular soil and locality.

1. If he knows the character of the rock from which his soil was originally formed, his task is comparatively easy; for from the known composition of the rock, he can come very near that of the soil.

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2. If he has no knowledge of this kind, he can still hope to arrive at good results, by deductions from the known character of the crops that have been chiefly cultivated upon his farm. He can tell what are the substances that have been most probably exhausted by these crops, and experiment accordingly with manures in which those are the chief constituents.

3. A still more satisfactory way, would be to procure good analyses of soils by really competent persons. By these, the defect or defects would at once be pointed out, and the most economical remedy indicated. Unfortunately few are able to procure such analyses readily, and the majority must therefore have recourse to one of the two first methods of examination, or a union of them both.

I say "good analyses by really competent persons," with the design of hinting that some care is necessary in this matter. A poor analysis is worse than nothing, as it not only involves the farmer in unsuccessful experiments, but in their failure throws discredit on the whole cause of scientific improvement.

Many persons make analyses of soils hastily and carelessly, grudging the time and caution necessary to the obtaining of a good result; and others are really deficient in their knowledge of chemical investigations. In both cases, mistakes, without end, are usually the only result.

It is not an easy thing to derive positive or valuable information from imperfect analyses; for they are usually most defective as regards the substances that are present in the smallest quantities, such as phosphoric acid, potash, soda, etc., the true proportion of which, as has already been explained, it is of great importance to know.

OF MANURES.

OF THE NECESSITY FOR MANURES IN MOST SOILS.

Having now considered the character of the soil, and that of the crops in connection with each other, we see that there is no hope of keeping up and increasing the produce of any land, unless there is from some source a supply of fertilizing substances to restore those that are carried away by the crops. Some soils containing constantly decomposing rocks, or peculiar springs, or subject to annual overflows whereby enriching substances are deposited, need no other foreign supply; but these are rare when compared with those that require a constant and regular system of addition, to render them properly productive.

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To the various manures employed for this purpose, we shall now turn our attention. Before taking them up in any regular classification, I may properly devote a few words to one particular method of enriching the soil, which cannot easily be brought into either of the classes. I refer to irrigation.

OF IRRIGATION.

This method of improvement is of course only applicable in particular situations, such as where a head and flow of water can be obtained, and where also the ground to be flowed is in grass or growing grain. All water, except rain water, even that from the purest springs, has mineral substances and organic substances in solution. As it flows over the surface among living plants, and in sinking through the soil comes in contact there with their roots, it yields up these substances for food. Beside such solid bodies, it contains in solution carbonic acid and oxygen, both of which the plant also receives with avidity.

The surface of a field to be irrigated must of course be somewhat sloping, and the water is brought on by a main ditch at the head of the slope. In this main ditch, at proper distances, are gates to regulate the flow of water into smaller ditches, from the sides and ends of which again run small cuts; these are so arranged that every part of the field shall be flowed over by a thin but regular sheet of water. At the foot of the slope is another ditch, for the purpose of conveying away such of the water as may not sink into the earth. Where water is scarce, and the slope long, it is occasionally used several times in succession. When the flow has been continued for ten days or a fortnight at a time, the supply gates are shut down, and the field allowed to dry. The operation is often repeated once or twice in a season.

The effect of water in this case, is not like that alluded to before in treating of swamps and wet land. Here there is no stagnation; the water is always running and fresh. Land that is intended to be irrigated should have a porous subsoil, or if not, should be underdrained; in either case the water sinks away as soon as the flow is stopped, the soil dries, and the plants get at once the full benefit of all the fertilizing matter that has been deposited.

In many parts of this country, irrigated meadows and pastures might be formed, which would produce heavy grass for hay early in the season, and then by occasional flowing furnish rich and abundant pasture during the hot and dry weather of summer. In the neighborhood of cities and large towns, it is sometimes practicable to irrigate with water from the sewers and drains; this is one of the richest of manures. In the vicinity of Edinburgh, Scotland, a poor sandy tract has by such

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means been converted into a perfect garden, which rents at an enormous sum, and furnishes successive crops of grass, from early spring to late autumn.

CLASSIFICATION OF MANURES. OF VEGETABLE MANURES.

We will now return to the classification of manures. They may be divided into three great classes, vegetable, animal and mineral. These we will consider in the order above given. After all that has been said as to its effects, it is scarcely necessary now to give any elaborate definition as to the precise meaning of the word *manure*; anything is a manure that gives food to plants, either directly or indirectly.

Vegetable manures are numerous and important; some of them have been already mentioned, when treating of the plowing in of green crops. They are not so energetic in their action as other manures yet to be noticed, but are invaluable as a cheap means of renovating, bringing up, and sustaining the land. Clover is one of the principal crops employed for this purpose, more largely on this continent than any other; buckwheat, rye, rape, wild mustard, sainfoin, spurry, turnips, sown thick, indian corn, sown thick, and cow peas, are some of those more commonly used in this and other countries. They add organic matter largely to the soil, which organic matter they have drawn in great part from the air, and their roots bring inorganic substances from the subsoil to the surface, so that it is within the reach of succeeding crops. There are differences of opinion in various districts as to the proper period for plowing these crops under: it is a matter to be settled by experience and convenience. They not only add fertilizing substances to the soil; they also improve its physical character. A light soil is somewhat consolidated, and rendered more retentive of moisture, while a stiff one is mellowed and loosened. Some of these green crops, such as spurry and buckwheat, will grow well on extremely light, sandy soils. After they have grown up and been plowed in a few times, the land is so improved that it will bear crops of a more valuable nature; and thus by a continuance of them at proper intervals, it may not only be kept up, but steadily improving.

The same effects follow the plowing of grass land, and turning under of the turf. The thicker and heavier the sward, the better, because then a larger amount of fresh, decomposable organic matter, in the form of roots, is added to the soil. Where land has been in grass for some years, say four or five, the weight of roots under the surface is in some cases twice as much as the weight of the grass above; these roots all decompose, and of course enrich the soil very materially.

There are few cases in which a judicious course of green cropping will not improve land. In the worst instances, it is sometimes necessary to

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make numerous trials before even the hardiest green crop will succeed; when this difficulty is overcome, and a good growth once obtained, experienced farmers say that the land may by proper after management be brought to any desirable state of fertility. It must always be remembered in bringing up land by green crops, that they really add no inorganic matter to the soil; they only bring it up from the subsoil, and render insoluble combinations near the surface soluble. The inorganic part of the soil, therefore, is actually diminishing by the occasional crops which are taken; and while improving by these means, care should for this reason be taken to add occasionally some form of mineral manure.

The practice of turning the turf upon one edge when plowing, seems to be gaining ground; it is said by its advocates that the turf rots more surely and speedily. Those who contend for laying it flat, say that the weeds are thereby more effectually killed, and that the fields may be made smoother. Potato tops, turnip and beet tops, green weeds, leaves, and every form of green vegetable matter, may be advantageously plowed in at once, or carted to the compost heap. Nothing of the kind should be neglected.

Straw is not usually applied to the land until it has been worked over by animals, and mixed with their manure: in this form we shall refer to it again. When applied alone, it is usually best and most convenient to rot it down in a compost heap, as the long straw is only plowed under with difficulty. On stiff clay soils it is, however, very beneficial to bury long straw, as then it serves to loosen and mellow the clay, both by lying among and separating the lumps, and by its gradual fermentation and decay. It has been found good practice, in many parts of the country, to draw out straw in the autumn, and lay a thin covering of it over winter grain. This serves as a protection during winter, and retains moisture when necessary during a dry spring or early summer. By the time that the stubble is plowed, it has decayed so as to turn under easily, and forms quite a rich coating in the way of manure.

In the neighborhood of the sea, where seaweed can be obtained, the farmer should embrace every opportunity for getting it. In England and Scotland, the right of way to a beach where seaweed can be had, increases the rent of a farm several shillings per acre. On many parts of our own coast, too, the farmers are very eager to obtain it. The ash of some seaweeds analyzed by Prof. Johnston gave the following results:

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TABLE IV.

Potash and soda,	from	15 to 40	per cent.
Lime,	—	3 — 21	"
Magnesia,	—	7 — 15	"
Common salt,	—	3 — 35	"
Phosphate of lime,	—	3 — 10	"
Sulphuric acid,	—	14 — 31	"
Silica,	—	1 — 11	"

This table shows that these ashes are rich in the substances most needed by our crops, particularly in potash, soda, sulphuric acid, and phosphoric acid. The quantity of ash that they leave when dry, is larger than that in straw or hay. When freshly taken from the sea, they contain a very large proportion of water.

Seaweed is plowed in green, or applied as compost. In either case it decays very rapidly, unless extremely dry, and produces most of its effects upon the first crop. Many of the seaweeds contain much nitrogen; and this, while it adds greatly to their value as manures, increases the rapidity with which they decompose.

In England rape dust is largely used as a manure, and with much advantage. The rape seed is pressed to obtain its oil, just as linseed is, and the hard cake formed by pressure sold for manure. Four or five hundred weight per acre are applied as a top dressing, or from 1500 to 2000 lbs., when it is plowed in. This is therefore a powerful manure, and is so portable that it would be valuable in this country could it be procured at a reasonable rate. Where green vegetable manures of any description can be easily obtained away from the farm, the farmer will do well to remember that there is an especial advantage in their application; they add to his land not only organic, but inorganic substances which have never been there before, and are consequently a clear gain to the soil in every respect.

OF ANIMAL MANURES.

We will now take up the second class, the animal manures. These comprise the blood, flesh, hair, horns, bones and excrements of animals. Manures of this class are more powerful by far than the vegetable manures, because they contain so much more nitrogen. I now simply state this fact; the reason why nitrogen is so efficacious, will be given hereafter. Blood and flesh are among the most valuable of all; wherever they can be obtained, they should be secured at once, and either buried or made into compost. All of the offal from slaughter-houses is of much value, though in this country it is often entirely wasted.

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It is not uncommon, in many districts, to see horses or cattle that die from disease, drawn out to some secluded spot, and there left to decay on the surface. These are known to be some of the most powerful manures, that the farmer could obtain; equal to guano, poudrette, or any of the other more costly fertilizers. Every animal that dies should be made into a compost, or buried in pieces at once. The best plan is to separate the flesh, which decomposes readily and produces an immediate effect, and make use of the bones according to some of the methods to be hereafter described.

The hair of animals is an exceedingly rich manure; for this reason woolen rags, and the waste from woolen mills, are both considered valuable in England; they are sold there at from $20 to $40 per ton, and are eagerly sought after at these prices, as not only very fertilizing, but also very lasting in the soil. All of the hair obtained from the furs of animals is there scrupulously saved, and sold at a high price. Twenty or thirty bushels per acre produce an excellent effect.

All these parts of the animal leave an ash corresponding with that of plants in the substances which it contains, with the single exception of silica; this does not seem to enter into the composition of the animal. We are then now able to point out distinctions between the inorganic matter in the soil, in the plant, and in the animal. They all contain the same substances, if we omit silica and alumina.

TABLE V.

The soil contains silica and alumina.
The plant contains silica, but no alumina.
The animal contains neither silica nor alumina.

OF BONES.

There is one important part of the animal yet unnoticed, that is the bones. Their composition is, when dry, earthy matter about 66 lbs. in 100; organic matter that burns away, about 34 lbs.

a. This earthy matter consists for the most part of phosphate of lime, that is, lime in combination with phosphoric acid; these, as already shown, are two most valuable substances for application to any soil.

b. The organic part is called *gelatin*, or *glue;* this is boiled out by the glue-makers: it is extremely rich in nitrogen, and is therefore an excellent manure. We thus see, at once, how important a source of nourishment for our land is to be found in bones. They unite, from the above statement, some of the most efficacious and desirable organic and inorganic manures. Both of these parts are fitted to minister powerfully to the growth of the plant.

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When the bones are applied whole, the effect is not very marked at first, because they decay slowly in the soil: it is also necessary to put on a large quantity per acre. The best way is to have them crushed to powder, or to fine fragments, in mills. Ten bushels of dust will produce a more immediate and abundant result than 80 or 100 bushels of whole bones, although, of course, the effect will be sooner over. An advantageous way of using them, is to put on 8 to 10 bushels of dust per acre, and half the usual quantity of farm-yard manure.

Boiled bones, that have been used by the glue makers, are still quite valuable: they have lost the greater part of their gelatine, but the phosphates remain; and the bones are so softened by the long boiling that they have undergone, as to decompose quickly, and afford an immediate supply of food to plants.

Another most important form of applying bones, is in a state of solution by sulphuric acid, (oil of vitriol.) This is a cheap substance, costing by the carboy not more than 2½ to 3 cents per lb. To every 100 lbs. of bones, about 50 to 60 of acid are taken; if bone dust is used, from 25 to 45 lbs. of acid is sufficient. The acid must be mixed with two or three times its bulk of water, because if applied strong it would only burn and blacken the bones without dissolving them.

a. The bones are placed in a tub, and a portion of the previously diluted acid poured upon them. After standing a day, another portion of acid may be poured on; and finally the last on the third day, if they are not already dissolved. The mass should be often stirred.

b. Another good way is to place the bones in a heap upon any convenient floor, and pour a portion of the acid upon them. After standing half a day, the heap should be thoroughly mixed, and a little more acid added; this to be continued so long as necessary. It is a method which I have known to prove very successful.

In either case the bones will ultimately soften and dissolve to a kind of paste; this may be mixed with twenty or thirty times its bulk of water, and applied to the land by means of an ordinary water cart. Used in this way, it produces a wonderful effect upon nearly all crops.

A more convenient method in most cases is to thoroughly mix the pasty mass of dissolved bones with a large quantity of ashes, peat earth, sawdust, or charcoal dust. It can then be sown by hand, or dropped from a drill machine. Two or three bushels of these dissolved bones, with half the usual quantity of yard manure, are sufficient for an acre. This is, therefore, an exceedingly powerful fertilizer. One reason for its remarkable effect is, that the bones are by dissolving brought into a state of such minute division that they are easily and at once available

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for the plant. A peculiar phosphate of lime is formed, called by chemists a *superphosphate*, which is very soluble; and in addition to this we have the sulphuric acid, of itself an excellent application to most soils.

Bones are useful in nearly every district, and are peculiarly adapted to all, or at least to most of those situations, where the land, without heavy manuring, no longer bears good wheat, or Indian corn, or other grains. In a great majority of cases, where land is run down by grain cropping, the use of bones in some of the forms above mentioned, is of all things the most likely to meet the deficiency. It will be remembered that the ash of grain is peculiarly rich in phosphates; consequently, as grain is generally sold off, the phosphates are most readily exhausted; in bones, therefore, we find just the manure for restoring them, and with little expense. This has been already tried in some parts of the country, and with most encouraging success. I would particularly recommend farmers to experiment with bones dissolved in sulphuric acid. The dissolving of them is a simple business, and can be easily shown on a small scale, by the teacher to his class. He can do it, for instance, in a teacup or tumbler, or on a plate or a flat stone. The cheapness of this manure is a great recommendation. Two bushels of bones would not certainly cost more than $1.00; then say 50 lbs. of acid to dissolve them, would cost by the carboy, $1·50, making only $2.50, for a quantity quite sufficient for an acre, with half the usual dressing farm-yard manure. It would be worth almost as much as this, to cart the common manure from the yard, to say nothing of its value. There are few farms on which bones enough might not be collected in the cousse of a year, to help out in this way the manuring of several acres.

Bones may not only be applied successfully to the ordinary cultivated crops, but also to meadows and pastures. In some of the older dairy districts, a few bushels of bone dust per acre will at once restore worn-out pastures. The reason is, that the milk and cheese, which are in one form or another, sold and carried away, contain considerable quantities of phosphates in their ash. These are restored to the land by bones. It is calculated by Prof. Johnston, that a cow giving 20 quarts of milk per day, takes from the soil about 2 lbs. of phosphate of lime or bone earth in each week. There would thus be required three or four lbs. of bones, to make good this loss. If it is not made good in some way, the rich grasses after a time cease to flourish; being succeeded by those which require less phosphate of lime, and therefore do not furnish, when eaten by the cow, so rich or so abundant milk.

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All of these uses of bones which have been described, are understood and appreciated in England; so much so, that the bones are all collected with most scrupulous care, and are even imported from every other country where they can be advantageously obtained. It is to be hoped that the great waste of them in this country may soon cease, and that they will be eagerly sought after by American farmers.

This much as to the fertilizing value of the various parts of animals: we enter next, on another most important department of animal manures.

MANURES (CONTINUED.)

OF THE MANURES FROM DOMESTIC ANIMALS, AND THEIR PRESERVATION.

The manure of various domestic animals is, in this country, most commonly employed as a fertilizer, all other manures being used in comparatively small quantities; and yet even these are seldom preserved and applied as carefully as they might, or ought to be.

The principal varieties are those of the ox, the cow, the hog, the horse and the sheep. Of these, that of the horse is most valuable in its fresh state; it contains much nitrogen, but is very liable to lose by fermentation. That of the hog comes next. That of the cow is placed at the bottom of the list. This is because the enriching substances of her food go principally to the formation of milk, the manure being thereby rendered poorer.

The manure of all these animals is far richer than the food given them, because it contains much more nitrogen. This is for the reason that a large part of the carbon and oxygen of the food are consumed in the lungs and blood generally, for the purpose of keeping up the heat of the body. They are given off from the lungs, and also by perspiration and evaporation through the pores of the skin, in the forms of carbonic acid and water.

From animals fed upon rich food, the manure is much more powerful than when it is poor. In England, for instance, where they fatten cattle largely on oil-cake, it is calculated that the increased value of the manure repays all of the outlay. This is the reason why human ordure is better than manure from any of the animals mentioned above, the food of man being rich and various.

All these kinds of manure should be carefully collected and preserved, both as to their liquid and solid parts. The liquid part or urine is particularly rich in the phosphates and in nitrogen. This part is by very many farmers permitted in a great degree to run away or

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evaporate. Some farm yards are contrived so as to throw the water off entirely, others convey it through a small ditch upon the nearest field. The liquid manure which might have fertilized several acres in the course of the season, is thus concentrated upon one small spot, and the consequence is a vegetation so rank as to be of very little use. Spots of this kind may be seen in the neighborhood of many farm yards, where the grass grows up so heavy that it falls down and rots at the bottom, and has to be cut some weeks before haying time, producing strong coarse hay that cattle will scarcely touch.

The proper way to save this liquid is to have a tank or hole, into which all the drainings of the yard may be conducted. If left here long, this liquid begins to ferment, and to lose nitrogen in the form of ammonia, which it will be remembered is a compound of nitrogen and hydrogen. To remedy this, a little sulphuric acid, or a few pounds of plaster, may be occasionally thrown in. The sulphuric acid will unite with the ammonia, and form sulphate of ammonia, which will remain unchanged, not being liable to evaporate. Others prefer to mix sufficient peat, ashes, sawdust, or fine charcoal, with the liquid in the tank, to soak it all up; others still pump it out and pour it upon a compost heap. One point is to be noticed in the management of a tank. Only the water which naturally drains from the stables and yards should be allowed to enter it; all that falls from the eaves of the buildings should be discharged elsewhere. Regulated in this way, the tank will seldom overflow, and the manure collected in it will be of the most valuable and powerful description. The tank may be made of stone, brick or wood, as is most convenient, and need cost but very little.

While the liquid manure is actually in many cases almost entirely lost, the solid part is often allowed to drain and bleach, until nearly every thing soluble has washed away; or is exposed in heaps to ferment, without any covering. In such a case ammonia is always formed and given off; it may often be perceived by the smell, particularly in horse manure. The fact may also be shown, by dipping a feather in muriatic acid and waving it over the heap. If ammonia in any quantity is escaping, white fumes will be visible about the feather, caused by the formation of muriate of ammonia. A teacher can exemplify this by holding a feather, dipped in the same way, over an ammonia bottle. This escape of so valuable a substance may be in a great measure prevented by shovelling earth over the surface of the heap, to a depth of two or three inches. If this does not arrest it entirely, sprinkle a few handfuls of plaster upon the top; the sulphuric acid of the plaster will as before unite with the ammonia, and form sulphate of ammonia.

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Manures containing nitrogen in large quantity are so exceedingly valuable, because this gas is required to form gluten, and bodies of that class, in the plant; this is particularly in the seed, and sometimes also in the fruit. Plants can easily obtain an abundance of carbon, oxygen and hydrogen, from the air, the soil and manures. Not so with nitrogen. They cannot get it from the air; there is little of it in most soils: and hence manures which contain much of it, produce such a marked effect. Not that it is more *necessary* than the other organic bodies, but more scarce; at least in a form available for plants. The same reasoning applies to phosphoric acid, It is not more necessary than the other inorganic ingredients; but still is more valuable, because more uncommon in the soil and in manures.

In all places where manure is protected from the sun, and from much washing by rain, its value is greatly increased.

a. Horse manure particularly should not be left exposed at all: it begins to heat and to lose nitrogen almost immediately, as may be perceived by the smell. It should be mixed with other manures, or covered by some absorbent earth as soon as possible. Almost every one who enters a stable in the morning, where there are many horses, must perceive the strong smell of ammonia that fills the place. I have seen in some stables, little pans containing plaster of paris or sulphuric acid, for the purpose of absorbing these fumes, and forming sulphate of ammonia. *b.* The liquid which runs from barnyards and from manure heaps, is shown by analysis to consist of the most fertilizing substances; and it is calculated that where this is all allowed to wash away, as is the case in many instances, the manure is often reduced nearly one-half in its value. I have seen yards where it was almost worthless, owing to long exposure.

The farmers of this country need awakening upon the subject of carefully preserving their common manures. In Flanders, where everything of the kind is saved with the greatest care, the liquid manure of a single cow for a year is valued at $10; here it is too often allowed to escape entirely. Either they are very foolish, or we are very wasteful.

OF MANURE FROM BIRDS. GUANO.

The manure of birds is richer than that of any animals, for the reason that here we have the liquid and solid excrements mixed together. On this account it is found to be particularly rich in nitrogen, and also in phosphates. The manure of pigeons, hens, ducks, geese and turkeys is very valuable, and should be carefully collected. The amount to be obtained from these sources may be thought so insignificant as to be unworthy of notice: but it must be remembered that three or four hun-

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dred lbs. of such manure, that has not been exposed to rain or sun, is worth at least 14 to 18 loads of ordinary manure.

Guano, a substance that has been so much used within the past few years, is a manure of this class. It is found in those tropical latitudes where there is seldom or never any continued rain. Immense numbers of sea birds build their nests, rear their young, and pass their time, when not upon the wing, on the rocky shores and small islets. Here their excrements have accumulated, layer upon layer, for centuries, remaining uninjured in those dry climates: beds of it have occasionally been found, from 15 to 25 feet in thickness. The food of these birds consists almost entirely of fish, and hence their manure is remarkably rich in its quality. The guano, in its best state, is this manure concentrated by the evaporation of its water.

The general composition of a few of the leading varieties is shown in the following table:

TABLE VI.

Variety.	Water: per cent.	Organic matter and ammoniacal salts.	Phosphates.
Bolivian, ...	5 to 7	56 – 64	25 – 29
Peruvian,.....	7 to 10	56 – 66	16 – 23
Chilian,.....	10 to 13	50 – 56	22 – 30
Ichaboe, ...	18 to 26	36 – 44	21 – 29

This, it is evident at a glance, is an extremely rich manure: the quantities of ammoniacal matter, and of phosphates, are remarkably large. The Ichaboe guano contains much more water than the others, because the climate in that region is not so dry as on the west coast of South America. It is also more decomposed, giving usually a strong smell of ammonia.

a. The Peruvian, Bolivian and Chilian varieties, have very little smell of ammonia; but if they are mixed with a little quicklime, and gently heated, the odor becomes extremely powerful.

b. This little experiment also shows that quicklime or caustic lime should not be mixed with manures containing much nitrogen, as through its agency ammonia is formed, passes off into the air, and is lost.

Guano is so energetic in its action, that it should not come in contact with the seed, as it might destroy its vitality. In dry seasons it frequently produces very little effect, owing to its not being dissolved. From 2 to 5 cwt. per acre are applied; more than 5 cwt. makes vegetation too coarse and luxuriant. I knew of 8 cwt. being put upon an acre of turnips: they all grew to tops, and produced no bulbs. Even the succeeding crop of wheat was so rank in its growth that the grain

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was miserable. The best way of applying it, and indeed all of these powerful fertilizers, is at the rate of from 1 to 2 cwt. per acre, together with half the usual quantity of barnyard manure. The supply of organic matter in the soil is thus kept up, while large crops are at the same time obtained.

It is a good plan, in the case of winter grain, to sow on 1 cwt. when the grain is sown, and 1 cwt. in the spring as a top dressing. In sowing, it is best to mix with ashes, sawdust, peat, etc. The effect of guano is not usually perceptible after the second year; and if the first season be favorable, its most decided action is in the first year.

I have recommended that experiments be tried in dissolving guano, or at least its phosphates, in sulphuric acid. The same superphosphate would be formed as by its action upon bones. Ten or fifteen lbs. of acid, to 100 lbs. of guano, would be sufficient. A smaller quantity of guano might in this way be expected to produce an equal effect. It is quite liable to adulteration, and should only be bought warranted as to its purity, that the farmer may have a remedy in a case of disappointment arising from its poor quality. This is a good rule to apply to all of these high priced manures.

OF FISH MANURES.

Another animal manure is fish, and one which is of very great value to districts near the sea. In many waters, white fish and other varieties are caught in immense numbers for this purpose alone; in other places large quantities of refuse, the heads and cleanings, can be had. These are all extremely valuable. On Chesapeake Bay, in Maryland, the farmers collect this refuse from the fisheries with great eagerness, and cart it many miles inland. In other sections it is neglected entirely.

The flesh of fish contains large quantities of nitrogen, and acts with much energy in hastening the growth of plants. The bones contain more water, and consequently, in their wet state, less phosphates than those of animals; but this very softness occasions their rapid decay, and more speedy action. Dry fish bones are richer in phosphates than the bones of animals. Fish decomposes so quickly, that it should either be plowed under, or made into a well covered compost heap at once: probably the last is best. It is difficult to cover them in the soil so that some loss shall not take place.

The use of this manure, for the reasons given above, has been confined to the immediate vicinity of the sea-coast. It would be very desirable to find some method of preserving it so that it might bear transportation without losing its good qualities, and without becoming offensive. Experiments are now being made, with a view to this result,

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which bid fair to prove entirely successful, and to bring this admirable manure within the reach of the interior at a reasonable rate.

On many parts of the Scotch coasts, there are extensive beds of scollops and muscles, which are got up and applied largely to the land with excellent effect. Our farmers near the sea would do well to seek supplies of this kind also. The shells of all shell-fish are valuable, on account of the lime which forms their chief bulk, and the animal inhabitants are remarkably rich in nitrogen. They all decompose rapidly, and require immediate attention to prevent loss.

Thin shells, such as muscles, soft clams, etc., crumble down quite rapidly: thick shells require cracking and crushing, to ensure their speedy decomposition.

OF SALINE AND MINERAL MANURES.

The last class of manures embraces those of a saline and mineral character. These are numerous, but not many of them have been as yet largely used in this country. Beside those which are known here, I shall mention a few of those that have been found most efficacious abroad.

OF LIME.

I will commence with a mineral manure, whose use is most widely extended, in every country where Agriculture has made much advance. I refer to lime.

Lime is ordinarily found in the form of common limestone, or carbonate of lime, a combination of lime with carbonic acid. Every 100 lbs. of pure limestone contains about 44 lbs. of carbonic acid gas. This may be driven off by a high heat, as in the lime-kilns. The lime then remains in what is called the caustic state, or quicklime. It will burn the tongue, if applied to it. When water is poured upon it (this may be shown by teachers) it swells, cracks, heats, and finally crumbles to a fine powder. If the water is only used in sufficient quantity to slake the lime, it will all disappear, being entirely absorbed: it has in fact united with the lime, and becomes a part of the solid stone. The heat during slaking is caused by the chemical union of water and lime. A ton of limestone unites with about one-fourth of a ton of water.

If quicklime or slaked lime is exposed to the air, it gradually absorbs carbonic acid; and if left a long time, becomes nearly all carbonate once more. If a piece of quicklime be left exposed in this way until it has crumbled, it will effervesce again with muriatic acid, as the limestone did before it was burned, thus proving the fact just stated.

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Lime is applied to the land in the three states above mentioned: quicklime, hydrate or slaked lime, and air-slaked or mild lime, so called because it has lost its caustic properties. It is better for the land in all of these states, than it was before burning, because the burning has reduced it to an extremely fine powder, more fitted to be dissolved in the soil, and to be taken up by the plant. From the various tables already given, it is obvious that lime is an absolutely essential ingredient in the soil, being constantly needed by plants in all of their parts: but beside this, it performs other functions there of scarcely less importance, differing according to the state in which it is applied.

a. If the soil be stiff and cold, if it is newly drained, containing much of acid organic compounds, or if there are tough, obstinate grasses to eradicate, such as bent, etc., it is best to apply quicklime, or the caustic hydrate. In either of these conditions it has a most beneficial and energetic action; lightening and mellowing stiff clays, neutralizing and decomposing injurious acid substances, and extirpating many hurtful grasses and weeds.

b. If caustic lime is applied largely to light soils, it may do harm by too rapidly decomposing the organic matter usually scarce in soils of this description. In all such cases, and generally when it is not wished to produce such effects as the above, mild or air-slaked lime is best.

The action of all varieties is invariably more marked and permanent upon drained or thoroughly dry land, than upon that which is wet and swampy. All of these various states of lime act not only upon the organic matter in the soil, but upon the inorganic also, decomposing certain insoluble compounds, and bringing them into a state favorable to the sustenance of plants. Thus we see that this manure performs many most important functions.

It has a constant tendency to sink in the soil, and in one that has been heavily limed for many years, quite a layer of it exists in the subsoil: this may be brought up by deep plowing, or is made available by drains, which permit the roots to go down. When applied as a top dressing, it should in almost every case be mild, and also when used in composts, where much animal manure is present. The reason why precaution should be used in the latter instance, is one that has been alluded to before, in speaking of manures containing nitrogen. In all such cases, caustic lime causes a formation of ammonia from the nitrogen, and a consequent escape of it into the air. Where much lime is mixed with the manure, its depreciation in value is very rapid, owing to this loss. Where there is little or no nitrogen present, and it is de-

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sired to decompose peat, or to rot heaps of weeds and turf, the caustic lime is to be preferred, as its action is so much more energetic.

It is now considered the best practice to apply lime in rather small quantities, and often, as then it is kept near the surface, and always active. Where it is bought, lime should always, if possible, be in a state of quicklime, as in that case there will be neither water nor carbonic acid to transport. In 100 lbs. of carbonate of lime or common limestone, are 44 lbs. of water; in 100 lbs. of slaked lime, about 25 lbs. of water, so that the saving in both instances by carrying quicklime is considerable.

Numerous kinds of limestone, differing greatly in purity, are found in various districts. In some sections they are all magnesian limestones, or dolomites, as these are called by the mineralogists, containing, beside carbonate of lime, carbonate of magnesia. Where the magnesia is in large quantity, it is decidedly injurious, and in some cases is so much as to render the limestone inadmissible for agricultural purposes. It is these from which the hydraulic or water cement is made. Although magnesia is necessary to plants, caustic magnesia, if introduced in large quantity into the soil, seems to produce a very bad effect, and lime that contains much of it is therefore to be avoided.

Beside limestones, there are several other forms in which lime is largely used by the farmer. The chief of these is marl. This substance consists usually of the fragments and dust of sea, fresh water, or land shells, more or less mixed with earth. When pure, the greater proportion is carbonate of lime. The following table gives the composition of a very excellent one, lately analyzed in my laboratory. It was from Peterboro', N. Y.:

TABLE VII.

	lbs. in 100
Carbonic acid,.....	35.00
Lime,.....	45.02
Magnesia,.....	0.66
Iron and alumina, with a little phosphoric acid,.....	2.69
Sand,.....	9.57
Organic matter,.....	7.06
	100.00

Here the carbonate of lime amounts to about 80 lbs. in 100, while the small quantities of magnesia, iron, alumina, and especially of phosphoric acid, add materially to its value. There are many marls which do not contain more than from 15 to 25 per cent of lime. It is necessary

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to apply these in much larger quantity, to produce an equal effect, and of course they will not bear transportation to so great a distance. In using marls, it is always best to put on heavier doses than of any form of burned lime, as there is not, from its mild nature, the same risk of adding too much.

There are in this country some substances used largely as manure, and called marls, that have very little lime in them. These are in certain parts of New Jersey. The lime in shells scattered through them, varies from 10 to 20 per cent in some specimens, in others there is scarcely any at all. The effect of these marls is, however, great upon poor soils, and in New Jersey they are very largely applied. The secret of their value lies chiefly in from 12 to 20 per cent of potash, which the best of them contain, according to the analyses of Prof. H. D. Rodgers.

It is always easy to ascertain whether any substance supposed to be a marl, really is so or not, by trying it with a little muriatic acid. If there is much carbonate of lime, the effervescence will be strong and violent, owing to the bubbling up and escape of carbonic acid gas. Carbonate of magnesia and many other carbonates would, it is true, produce a like appearance; but these are rarely found native, in very large quantities.

On some sections of the sea coast, a species of shell or coral sand is to be obtained, made up of shells or corals ground into fine fragments by the action of the sea: this is always a valuable manure. On the coast of Ireland, the fishermen go out and scoop it up from a considerable depth. It contains usually some organic remains, which add materially to its value. This, like the marls, may be safely added to the land in large quantities, without fear of injury to crops.

OF GYPSUM.

Another important manure in which lime forms a part, is plaster of of paris, also called gypsum, and chemically, sulphate of lime. In this country, it has been more generally used, perhaps, than in any other, and often with very great benefit. In many cases, a few bushels per acre bring up land from poverty, to a very good bearing condition; complaints are, however, made, that after a time it injures the land in place of benefiting it. This, in almost all instances, results from using it alone, without applying other manures at the same time. The explanation is of the same general nature as that given under lime

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The farmer has taken away a variety of substances, and has only added gypsum. If the land is entirely exhausted at last under such treatment, it is obviously not the fault of the gypsum. There are many large districts where it produces no effect; but it may always be considered certain, that where gypsum or lime do no good, there is already, in one form or another, a supply of both naturally in the soil; or, as has been previously explained under lime, some physical or chemical defect which prevents their action.

Gypsum, before it is burned, consists of sulphuric acid, lime and water; of the latter, there are about 21 lbs. in every hundred. This water can be easily driven off by heating the ground gypsum. This may be done with a small quantity, by way of experiment, over a common lamp. During heating, it whitens; it is this burned gypsum that is used for the cornices of rooms, for making casts, for hard finish, etc. When water is mixed with it, a considerable degree of heat is produced, the 21 per cent. of water is again absorbed, becoming once more a part of the solid stone, and the whole mass hardening or *setting*, as it is termed, in a few moments. It is upon this property of hardening when mingled with water, that the uses of gypsum in the arts, as above mentioned, depend.

This manure frequently produces a most beneficial effect when applied as a top dressing upon pastures and meadows; it is also a favorite and excellent application to young corn and potatoes. It is of service, not only by the valuable nutriment which it furnishes to the plant, but also from a certain power which it possesses of absorbing moisture and gases.

a. Liebig has supposed that much of its effect upon grass land is owing to this property, that it attracts ammonia from the atmosphere, and retains it for the use of plants. This is without doubt an important effect, but should not be considered the principal one.

b. To this same property is to be ascribed its action when scattered over compost heaps, or mixed into the liquid in tanks. In both cases it absorbs ammonia, and prevents its escape. White fumes of ammonia may sometimes be perceived, both by the eye and the sense of smell, rising from the surface of fermenting manure heaps. A little gypsum sprinkled over the surface of the heap, will arrest this evaporation and loss almost immediately.

c. During drought, it seems, by its power of attracting moisture, to aid materially in sustaining the plant. It is slightly soluble in water, and hence slowly dissolves, either when buried in the soil, or left on

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the surface. It is best applied in damp weather, as then it can be sown more easily, and will produce an effect more quickly. The quantity applied per acre is usually not large.

OF COMMON SALT, NITRATES AND SULPHATES.

Common salt is a manure, the use of which is not only wide spread, but very ancient. In large quantities it is injurious, destroying vegetation rather than increasing its growth. In moderate quantities, however, it has been found on some soils very valuable. Such are most likely to occur in places far distant from the sea. The sea breeze carries small quantities of salt spray far inland, and deposits it upon the soil. All who live in the vicinity of salt water, know that its peculiar smell may often be perceived at a distance of many miles in the interior. For this reason salt is not usually found to be of much value as a manure near the sea.

A small proportion mixed in with a compost heap is likely to be useful. Another good way is to dissolve a little in water used for slaking quicklime. The compound thus formed is very energetic in its action upon vegetable substances, and has been found an admirable application to many soils, particularly on those where there is much inert vegetable matter that can only be decomposed with great difficulty. Common salt is, according to the popular definition, composed of chlorine and soda.

There are other combinations of soda, that are beginning to be used in this country, and have been greatly approved of in Europe. The most important of these is the nitrate of soda. This is composed of nitric acid (a substance before described) and soda. The nitric acid contains much nitrogen, and is therefore very active as a manure. One or two cwt. nitrate of soda have been found, in many instances, to produce a very great growth. It gives a bright dark green color to the leaves and increases the yield of grain. It also produces a marked improvement in grass crops and pastures. Grain that has been grown by aid of this manure is said not to give so much fine flour, being richer in gluten, and having a thicker skin.

Nitrate of soda is in some districts of South America a natural product, being found in a crust on the surface of the ground; it is so abundant as to be brought away by the shipload, and may be obtained at such prices as would warrant the application of it in moderate quantities. Other nitrates are manufactured which would be excellent manures, but the price is generally so high as to forbid their use with profit. Whenever refuse nitrate of potash, that is, common saltpetre

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can be obtained, or refuse liquid in which it has been dissolved for pickling meat etc., it should be mixed into a compost heap and carefully preserved.

There are several compounds containing sulphuric acid, called sulphates, that are also valuable whenever they can be had at reasonable prices. Those that have been most commonly employed, are the sulphates of magnesia and of soda. From their composition, both of these must be useful; but it would be necessary to exercise a degree of caution with the sulphate of magnesia, as it is very soluble, and much of it might do harm. It will be remembered that magnesia in any large quantity is quite injurious in the soil: small quantities are very useful.

The refuse liquid from salt-works, after the salt has been crystallized out, contains some soluble compounds of lime, magnesia, etc., and might, applied carefully in small quantities, be useful. Pouring a little occasionally upon a compost heap, would be the safest and best mode of trying it. A large dose of this liquid would be fatal to vegetation.

OF THE EFFECTS OF SALINE MANURES, AND THE BEST MODES OF APPLICATION.

The above are instances of saline manures, the few last given merely as examples of a class. In the following table are mentioned a few cases, recorded by Prof. Johnston, of their effect as applied upon various crops in Scotland:

TABLE VIII.

ON GRASS LAND.

	Product per acre.	Undressed.
Nitrate of soda, 1 cwt. per acre, ...	5 tons 4 cwt.	2 tons 12 cwt.
Nitrate of soda, 120 lbs. per acre, ...	3 tons ¼ cwt.	2 tons ¼ cwt.
Nitrate of potash, 1 cwt. per acre, ...	2 tons 3 cwt.	1 ton 1¼ cwt.

ON OATS.

Nitrate of pot. & nit. soda mixed, 1 cwt. per acre,	64 bushels.	48¼ bushels.
do do do do	60¾ bushels.	40 bushels.

ON WHEAT

Nitrate of pot. & nit. soda mixed, 1¼ cwt. pr. acre,	27 bushels.	18¼ bushels.
Nitrate of soda, 1 cwt.....	54 bushels.	42 bushels.

These, it will be recollected, are most favorable results, selected to show how great an influence such small quantities of these manures may have. From what has been explained relative to the proportion of ash contained in the crop, and the substances of which it is composed, we can now understand why such small quantities of these manures, seemingly thrown away when spread over an acre of ground, should still

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contain enough to supply all that is required by the plant of their particular constituents. The largest crop of wheat mentioned in Table viii., 54 bushels, would not carry away in all of the grain more than 60 lbs. of ash, and of this not more than 10 lbs. would be potash or soda. We see, then, that the 1 cwt. of nitrate of soda supplied enough of that material to have furnished at least 150 bushels, and a large part of the straw beside. The supplying of such minute quantities to the plant, we have seen to be quite necessary, as much so as are the bolts and nails to a ship: these are but a very small part of its entire bulk or weight, and yet it could not hold together without them.

When the farmer intends to use any of these manures, it is in nearly every case better to make a mixture. One hundred weight of nitrates of potash and soda, of common salt, sulphate of soda and sulphate of magnesia, all mingled together, and applied with a few bushels of gypsum, would be much more likely to meet the wants of any soil, than a hundred weight of either one alone. Such mixtures are found remarkably effectual, and they are the basis of the artificial manures now gradually coming into vogue. These manures are very excellent if the price is reasonable, and the farmer assured of their purity. I have known instances of most audacious cheating in these things, and in a way too that could not readily be discovered unless by a chemical examination. The farmer should not buy these manures unless he has perfect confidence in the manufacturers, or unless, as was recommended with regard to guano, they furnish an analysis by competent chemists, and *warrant* the manure sold to be equal in quality. If it fails him, he can them have compensation from them.

Where such saline manures as I have mentioned, or others having some of the ingredients known to be valuable for plants, can be obtained at fair rates, the farmer would do well to mix composts for himself; adding 25, 50, 100 or more pounds, as he may require, of various articles to his manure heap, or making small experimental heaps to try the effect of different substances, and different mixtures, on his soils. This last is the best course of all, as then he feels his way with little expense, and only invests largely when sure of his return. It must be remembered, that nearly all of these manures are so powerful, that if sown immediately with the seed, or laid on in too large quantities, they destroy vegetable life. Applied as top dressings, it is, as in the case of guano, advisable to mix with ashes, or dry vegetable mould, so as to facilitate even sowing, and equal distribution over the surface. Just before or after a rain is the best time. In a dry season, all of them, excepting gypsum, fail to produce their usual effect, and in some cases

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are said to have proved injurious. Some farmers, on this account, advise the application of a part in the autumn, and the remainder at the earliest advisable period in the spring. This is an excellent plan for several reasons. If all be applied in autumn, a part washes away during winter and is lost. The half which is added is enough to give the young shoots a vigorous start, and a firm hold in the soil before winter comes on; then in spring the other half comes with none of its strength or substance lost, to push them forward through the changes of that season, and to ensure an early harvest.

OF WOOD AND COAL ASHES.

Nearly all varieties of ashes are valuable as manures. Those from sea-weed are used in some localities, and are of very great value; but where the whole weed can be obtained, it is better to employ it in the fresh state, so as to add its organic matter also.

Wood ashes are very commonly used, and form a manure of great value. Below is the composition, from Johnston's Lectures, of ash from the oak and the beech: these are merely given as illustrating the general character of wood ashes.

TABLE IX.

Percentage of	Oak.	Beech.
Potash,	8.43	15.83
Soda,	5.64	2.79
Common salt,	0.02	0.23
Lime,	74.63	62.37
Sulphate of lime,	1.98	2.31
Magnesia,	4.49	11.29
Oxide of iron,	0.57	0.79
Phosphoric acid,	3.46	3.07
Silica,	0.78	1.32
	100.00	100.00

The substances composing these ashes, are seen at a glance to be of a valuable character for applying to the soil. Even without an analysis, we might confidently have asserted that this would be the case, from the fact that they had already been found proper for the support of vegetation. It will be noticed that the proprortion of potash and soda is very considerable, being in fact more in the above ashes than in most others. Beside these there is quite an appreciable proportion of phosphoric acid, and a very large quantity of lime: part of this was in combination with the phosphoric acid. The potash, soda, lime and

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magnesia, were doubtless for the most part combined with carbonic acid, forming carbonates. The potash, soda and common salt, being soluble in water, of course act first and disappear first; the lime and other constituents come into action more slowly, but still are always steadily decomposing, and constantly yielding food for the plant. The effect of a heavy dose of ashes, therefore, is quite lasting.

A favorite application of this manure is as a top dressing upon grass crops, also for dusting over young corn and potatoes. For this purpose, ashes are often used with gypsum. They are very useful to absorb liquid from composts or in tanks, or, as has been mentioned in various places, to mix with guano and other portable manures for sowing. From the considerable proportion of alkali contained in them, they are quite caustic, and hence seem to have a very good effect in extirpating troublesome weeds, on meadows and pastures. Their action in running out poor grasses, such as bent, etc., when the land is otherwise well treated, is familiar to practical men. They do this by adding to the soil substances which encourage the natural growth of more valuable classes.

Spent or lixiviated ashes, that is, those that have been used by soap or potash-makers, are of course much less valuable, inasmuch as they have lost nearly every thing that is soluble in water. Two-thirds, and oftener three-fourths of their bulk, however, continue unchanged, and in this part there still remains the lime, the magnesia, the phosphates, etc., which are of importance; for this reason, these ashes should also be always carefully saved and applied. They are good for all of the purposes to which ashes are applied; good to mix with liquids or solids; and they can usually be obtained at very cheap rates. Being of so much less strength, they may profitably be applied in greatly increased quantity, and thus by the large proportion of slowly dissolving lime and phosphates which they contain, form quite a permanent addition to the valuable ingredients of the soil.

Anthracite coal ashes should not be neglected. There are always cinders enough to pay for sifting, and, when sifted, soap-makers are usually willing to pay a small price for them. This shows that they contain soluble matter enough to be well worth saving. We have no very good analysis of anthracite ash. The English bituminous coals contains 8 to 12 per cent. of lime and magnesia, and some soda, the remainder being chiefly silica and alumina. The ash from American bituminous coals, probably resembles the English in its character. Some partial examinations made in my own laboratory at Yale College, indicates small quantities of phosphates in anthracite ash, and in the specimens examined about two per cent. of substances soluble in water

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Such facts all show that these ashes should be preserved, and applied either as a top dressing upon grass, or plowed in as a part of composts. They would have much of the beneficial mechanical effect of common ashes, and are also good for sowing with portable manures.

It has been said that when placed around trees in large quantities, they are injurious; and this is probably true, because they have something of a caustic character, but it is no reason for their condemnation; wood ashes, or any of the powerful manures which we have been describing, such as guano, or the nitrates, would do the same if applied with like freedom. A manure which is highly beneficial in small quantity, may, in large quantity, be perfectly destructive to vegetation.

OF PEAT ASHES, SOOT, ETC.

In all situations where peat is burned, the ashes will be found worth something as manure. They usually contain 5 or 6 per cent. of potash and soda, considerable quantities of lime, magnesia, iron, etc., being therefore worth about as much as the poorer kinds of wood ashes. In wet land, where varieties of peat abound, which are only decomposed with great difficulty, it is sometimes advisable to burn on a large scale, for the purpose of obtaining the ash as manure. Heaps are made at convenient distances directly upon the surface of the bog, and the fire started by means of a little dry peat in the centre of each heap. As it burns through to the outside, fresh peat is dug up and thrown on, and so the process may be kept up as long as desirable.

It is to be observed, as to all these varieties of ashes, that their value is greatly impaired by exposure to the weather. This is in very many cases not attended to; the ash heap is exposed to rain, and often to the drippings of a roof beside. In either case a large portion of the soluble and most valuable ingredients are washed away, and the worth of the ashes to the same extent diminished. They should, always, for these reasons, be kept carefully covered.

Soot is a manure that is much neglected in this country, but is highly valued abroad. It results from a species of distillation of wood, or of bituminous coal; the products of this distillation are condensed on the sides of the chimney, as the ascending smoke cools. The smoke also carries up and deposits large quantities of the inorganic bodies from the fuel. Soot thus comes to contain a great variety of both inorganic and organic bodies. We find, for one very prominent constituent, a large quantity of ammonia. Beside this, there are phosphates, sulphates, carbonates, and chlorides of lime, potash, soda, iron, and magnesia. These are the chief inorganic substances, and show it to be quite a powerful

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manure. It contains so much ammonia that when laid in heaps of grass, the plants under it are destroyed very speedily.

No analysis of soot is given here, because from the way in which it is deposited, the composition must vary greatly with the fuel, and with the circumstances of its combustion. In very dry seasons, soot, like some other of the powerful manures we have mentioned, sometimes does injury. From 30 to 60 bushels per acre are applied, commonly as a top dressing. It gives a beautiful dark green color to grass or grain, and on many soils increases the yield very largely. If a little exertion were made, there are few places where considerable quantities of this strong manure could not be obtained.

In Great Britain it has been proposed to crush decaying granites, to mix them in heaps with quicklime, and then allow the whole to stand for some months. Granite contains much potash, and it is supposed that by the prolonged action of the caustic lime, a part of this would become soluble, and fit for the nourishment of plants. In some parts of this country, masses of decayed rock exist, which it would be well to examine with reference to their economical value for applying to the land.

COMPOSITION OF THE DIFFERENT CROPS.

OF WHEAT, RYE, AND BARLEY.

We have already, to a considerable extent, entered upon this subject; but the information given, particularly with regard to the organic part of crops, has been of a very general character. We have noticed the chief substances which compose this part, but have said little as to their distribution in the plant, or in its several portions.

Various points relative to the composition of ash from the straw, grain, and roots of our ordinary crops, have been noticed heretofore, and we shall not revert to them at any length here.

In the stalk and leaves of grain, we find that woody fibre is the leading substance; constituting in some cases, when the plant is ripe, more than three-fourths of the whole weight. In the grain, on the other hand, woody fibre only amounts to 2 or 3 per cent. The largest part here usually consists of starch: there are also considerable quantities of gluten, or of some other bodies having the same nature, containing nitrogen; and beside these, some oily or fatty substances. In the straw, these last only exist in very small quantities.

a. All grains, as sold in market, or stored in granaries, and in the state usually considered dry, contain from 10 to 16 per cent of water, which may be driven off by a gentle heat. Nearly every variety of flour has a little larger amount than the above.

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We will now notice the composition of some of the leading varieties of grain, in their organic part.

Wheat is one of the most important of all crops. The grain contains from 50 to 70 per cent of starch, from 10 to 20 per cent of gluten, and from 3 to 5 per cent of fatty matter. The proportion of gluten is said to be largest in the grain of quite warm countries.

a. It is a singular fact, that in all the seeds of wheat, and of other grains, the principal part of the oil lies near, or in the skin, as also does a large portion of the gluten. The bran owes to this much of its nutritive and fattening qualities. Thus, in refining our flour to the utmost possible extent, we diminish somewhat its value for food. The phosphates of the ash also lie to a great degree in the skin.

b. These substances seem all to be collected here for the benefit of the young shoot. When it first starts, and until it appears above the surface and expands its first true leaves, it has to depend for nutriment on the stores already provided in the seed. These have been prepared not only, but deposited in that part of the seed most near to the germ, so that its nourishment may be easily and readily obtained.

The best fine flour contains about 70 lbs. of starch in each hundred. The residue of the hundred lbs. consists of 10 or 12 lbs. gluten, 6 to 8 lbs. of sugar and gum, 10 to 14 lbs. of water, and a little oil.

Gluten, as has been mentioned, swells up to a great bulk when heated, and becomes full of holes. The same thing takes place in the baking of bread. It is the gluten that gives tenacity to the dough, so that when bubbles of gas are liberated during the fermentation produced by yeast, the gluten stretches as it expands, and thus leaves the baked bread light and full of little holes. Flour which contains much gluten, is that which is ordinarily called strong.

The time of cutting grain very sensibly affects the proportion of fine flour and bran yielded by samples of it. Careful experiments have shown, with regard to wheat, that when cut from 10 to 14 days before it is fully ripe, the grain not only weighs heavier, but measures more: it is positively better in quality, producing a larger proportion of fine flour to the bushel. When the grain is in the milk, there is but little woody fibre; nearly every thing is starch, gluten, sugar, etc., with a large percentage of water. If cut 10 or 12 days before full ripeness, the proportion of woody fibre is still small; but as the grain ripens, the thickness of skin rapidly increases, woody fibre being formed at the expense of the starch and sugar; these must obviously diminish in a corresponding degree, the quality of the grain being of course injured. The same thing is true as to all of the other grains.

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It has been stated that what is ordinarily called dry flour, contains from 12 to 16 per cent of water. When made into bread and baked, it retains this, and absorbs in addition a much larger quantity. Prof. Johnston gives, as the result of some trials made in his laboratory on bread one day old, the large proportion of 45 lbs. of water in 100 lbs. of bread. Dumas found 45 per cent in bread at Paris. This is much more than is usually supposed possible, yet there is every reason to consider the above determination correct. We may then conclude that every 100 lbs. of bread, in the ordinary state as we use it, contains from 30 to 45 lbs. of water. Strong flour, that which was mentioned as containing much gluten, and rising well in bread, will absorb and retain a still larger amount of water: it is, therefore, most profitable to the baker.

Rye flour more nearly resembles wheaten flour in its composition than any other; it has, however, more of certain gummy and sugary substances, which make it tenacious, and also impart a sweetish taste. In baking all grains and roots which have much starch in them, a certain change takes place in their chemical composition.

If starch be taken and exposed to a carefully graduated heat for a few days, it will be found to have changed its character, to have become partially soluble in water, and also a little sweet. By the action of heat it has been converted into a species of sweetish gum, called *dextrine*. This is the change which occurs in baking; a portion of the starch is altered into this gum or dextrine, communicating the sweetish taste which is observable in good bread. By baking, then, flour becomes more nutritious, and more easily digestible, because more soluble. This alteration happens probably in baking any grain, but as wheat and rye are more used for making bread than other grains, we are better acquainted with the transformations which occur in them through the agency of heat.

Barley contains rather less starch than wheat, also less sugar and gum. There is little gluten, but a substance somewhat like it, and containing about the same amount of nitrogen.

a. The malting of barley depends on a peculiar change which takes place during germination, or the sprouting of the seed. The starch, forming the principal part of it, and of all or nearly all grains, is, as we know, insoluble in water; how then is it to be of use in nourishing the young shoot?

b. When the seed, moistened by water, and warmed by the summer sun, swells and pushes forth its shoot, a peculiar substance called *diastase* is formed, which has the property of changing starch into sugar.

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This sugar is of course soluble, and goes at once into the shoot, communicating that sweetness so observable in its first growth.

c. Barley is moistened and laid in heaps to sprout; when the sprouts have got to the proper length, the heaps are opened, dried, and heated, to stop further growth, and the sprouts are all rubbed off. The barley is then in the state called *malt;* the sugar from this is extracted to make beer, having all been formed from its starch by the action of diastase.

Oatmeal is little used as food in this country, but it is equal, if not superior in its nutritious qualities, to flour from any of the other grains; superior, I have no doubt, to most of the fine wheaten flour of northern latitudes. It contains from 10 to 18 per cent of a body having about the same amount of nitrogen as gluten. Beside this there is a considerable quantity of sugar and gum, and from 5 to 6 per cent of oil or fatty matter; which may be obtained in the form of a clear fragrant liquid. Oatmeal cakes owe their peculiar agreeable taste and smell to this oil. Oatmeal, then, has not only an abundance of substance containing nitrogen, but is also quite fattening. It is, in short, an excellent food for working animals, and, as has been abundantly proved in Scotland, for working men also.

OF BUCKWHEAT, RICE, INDIAN CORN, PEAS AND BEANS.

Buckwheat is less nutritious than the other grains which we have noticed. Its flour has from 6 to 10 per cent of nitrogenous compounds; about 50 per cent of starch, and from 5 to 8 of sugar and gum. In speaking of buckwheat or of oats, we of course mean without the husks.

Rice was formerly supposed to contain little nitrogen, but recent examinations have shown that there is a considerable proportion, some 6 or 8 per cent of a substance like gluten. The percentage of fatty matter and of sugar is quite small, but that of starch much larger than in any grain yet mentioned, being between 80 and 90 per cent, usually about 85. The dust or siftings separated from rice in cleaning for market, are stated by Prof. Johnston to contain 4 to 5 per cent of fatty matter, and are therefore valuable for feeding.

Indian corn is the last of the grains that we shall notice. This contains about 60 per cent. of starch, nearly the same as oats. The proportion of oil and gum is large, about 10 per cent.; this explains the fattening properties of Indian meal, so well known to practical men. There is, beside these, a good proportion of sugar. The nitrogenous substances are also considerable in quantity, some 12 to 16 per cent. All of these statements are from the prize essay of Mr. J. H. Salisbury,

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published by the New-York State Agricultural Society. They show that the results of European chemists hitherto published, have probably been obtained by the examination of varieties inferior to ours; they have not placed Indian corn much above the level of buckwheat or rice, whereas from the above it is seen to be in most respects superior to any other grain.

The same paper by Mr. Salisbury indicates some value in the cob of this grain. It contains about 2 per cent. of gluten and gum, and 1 or 2 per cent. of sugar, with a little starch. It has therefore some importance of its own as food, when ground up with the grain, according to a practice recommended of late by many farmers. The oil of Indian corn, like that of oats, has a peculiar odor and taste, communicating both to the meal.

Sweet corn differs from all of the other varieties, containing only about 18 per cent. of starch. The amount of sugar is of course quite large; the nitrogenous substances amount to the very large proportion of about 20 per cent., of gum, to 13 or 14, and of oil to about 11. This, from the above results, is one of the most nourishing crops grown. If it can be made to yield as much per acre as the harder varieties, it is well worthy of a trial on a large scale.

We now come to a different class of crops, remarkable for their nutritious properties. The best known of these are peas and beans. The most complete analyses yet made, are French, give the per centage of starch at about 40. The amount of oily matter is small, and of sugar only about 2 per cent. The nitrogenous bodies are of a peculiar nature, and are usually called legumin or albumen; they contain about as much nitrogen as gluten, and, in the dried peas or bean meal, amount to from 25 to 30 per cent. The meal, in its ordinary condition, contains from 15 to 20 per cent. of water.

Both peas and beans, are, according to the above statements, extremely nutritious. Experience in France, Germany and England, sustains this theoretical view. They are in all of those countries highly valued for feeding to stock, and are also a chief reliance as food among the lower classes, with whom they take the place of bread. They occasionally come into a rotation with great advantage, and their field culture will probably be gradually extended in this country.

There is one class of seeds, such as linseed, rape seed, etc., which abound in oil, amounting in some cases, to from 18 to 25 per cent.; this may be, and is, separated by simple pressure. Beside the oil, they are uncommonly rich in nitrogenous substances, containing about as much as peas or beans. These seeds, then, are of great value for

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feeding to fattening animals. A few pounds per day increases their growth remarkably. The linseed cake, from which the oil has been mostly expressed, is a most admirable food, and is nearly all exported from this country to England, for the use of British farmers, who know its value and are eager to purchase it.

OF THE ROOT CROPS.

In the root crops we find quite different characteristics from any yet mentioned. In some of them starch almost entirely disappears, other bodies of a somewhat similar nature taking its place. The potato, and a few other less known crops, are exceptions. Another distinguishing feature is the quantity of water which they all contain. About 16 per cent. has been the highest amount hitherto mentioned, but now we shall find a very greatly increased proportion.

The potato, as taken from the ground, contains about 75 per cent. of water, or three-fourths of its whole weight; of the remainder, from 14 to 20 per cent. is starch. There is about 1 per cent. of a nitrogenous compound like albumen, and the rest is made up of woody fibre, gum, and sugar. The starch of the potato is contained in little cells, and is in small rounded masses. Grating destroys the cells, and water will separate the starch as described before. When the tuber is attacked by potato disease, its first appearance is in the walls of the cells, the starch remaining uninjured for a considerable time; it can even be separated after the disease has progressed till the potato is worthless for any other purpose.

By keeping, the starch of potatoes gradually diminishes, being converted into a species of gum. This is the reason why potatoes are apt to be watery and soft in the spring, and to have a disagreeable sweetish taste. When they are allowed to sprout, from being in too warm a place, a great deterioration ensues. This is for the reason that the starch as in the grains, being turned in a great degree to sugar and gum during germination, goes into the young shoot; subtracting, of course, much from the nutritive qualities of the tuber.

The turnip abounds still more in water than the potato. The proportion given by Boussingault, is nine-tenths of its whole weight; other authors agree in making it about the same quantity. The remaining tenth contains woody fibre, a little oily substance, some gum, and about one per cent of nitrogenous compound. There is nothing more than a trace of starch, but a small per centage of a substance called *pectine*, which seems to answer the same purpose in feeding.

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The mangold-wurtzel, the carrot, the beet, and the parsnip, all contain in their fresh state from 85 to 90 per cent of water. The parsnip and the carrot have a little more of nitrogenous compounds than the others. The sugar-beet according to Payen, has about 10 per cent of sugar; carrots and parsnips, which are also quite sweet, have from 5 to 7 per cent. In nearly all of these roots, there are small quantities of starch, gum, and oily matter.

Such facts as the above may seem to place these crops very low in the scale, as to their nutritive properties; but before we decide this question, we must consider the amount that is produced per acre.

a. Twenty-five tons of turnips is not an uncommon crop on good land; if these contain but 10 lbs. of solid matter in every 100, the aggregate amount from 25 tons would be 5000 lbs.

b. Thirty bushels of wheat to the acre, at 60 lbs. per bushel, would only give 1800 lbs. The dry matter of the turnip is nearly as nutritious as wheaten flour, and we see from the above that there would be nearly three times as much of it. If we take some of the other roots, which produce quite as large a weight per acre and contain less water, the comparison will be still more favorable to root crops.

c. Indian corn competes better with them. Land that would yield 25 tons of turnips or 30 bushels of wheat to the acre, would produce 60 bushels of corn; and this at 60 lbs. per bushel, would give 3600 lbs. per acre, of food, superior to either of the others, weight for weight.

It is plain, from the above facts, that the root crops are of great value. The animal, it is true, has to eat very large quantities, to produce much increase in its size; but then the yield per acre is so exceedingly great, as to more than counterbalance this seeming disadvantage, in the comparison with more concentrated forms of food. The cultivation of these crops, to a considerable extent, will doubtless be found advantageous in districts where the climate and soil are well suited to them.

The cabbage has about 90 per cent of water, and much ash. The proportion of nitrogenous compounds is large, about 3 to 6 per cent; so that this vegetable might also be cultivated here, as it is abroad, for feeding purposes.

I mention all these crops, that the farmer may know something of their valuable properties, and may not consider himself tied down to a regular succession of two or three only, such as he has always been accustomed to cultivate, or to see others cultivate. He ought to know that there are others which are equally important, the occasional introduction of which may be beneficial not only to himself, but also to his land.

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OF THE GRASSES. THE COMPOSITION OF THE VARIOUS CROPS COMPARED.

There is yet one class of crops used for feeding, that has not been adverted to; this includes the grasses. These contain, when made into hay, about 10 or 12 per cent of water; in the green state, before drying, about 80 per cent. The dry part consists chiefly of woody fibre; besides this, there are small and variable quantities of nitrogenous bodies, gum, sugar, oil, etc. In some grasses, these amount to as much as three, four, and five per cent.

The time of cutting has much to do with the nutritive value of hay. While the stems and leaves are growing and green, they contain considerable quantities of sugar and gum, which, as they ripen, are, for a large part, transformed into dry, indigestible woody fibre; the remainder goes into the seeds; but, as every farmer knows, a great portion of these are lost from the hay, before it is fed out. Thus, after the grass has attained its full size and height, it loses by delay in cutting, and becomes, as to its stem and leaves, of poorer quality as it grows riper.

The same occurs in the straw of grains and in cornstalks. If they are cut from ten days to a fortnight before the grain ripens, their quality for feeding is greatly superior to what it would have been when they were ripe. This, with the benefit to the quantity and quality of grain before mentioned, constitutes a double advantage to be gained by cutting early.

We have thus briefly adverted to the general composition of the leading crops, and have shown the principal points of difference. We have seen that root crops produce the largest amount of nutritive matter per acre; and that next to them comes indian corn, then the other grains, and the oil-bearing seeds. The next subject is the final disposal of these crops in feeding.

It may be of advantage here, to append a table, giving a comparative view of the more common crops, as to their organic part: such a view of the inorganic part has been already given, in preceding tables. These analyses are not to be considered as representing exactly the invariable composition of these crops, but simply their general character. The greater portion of them are made up from Prof. Johnston's Lectures; a few are from other sources. They represent the composition of the whole seeds in the grains, not of the ground flour, from which most of the woody fibre or bran has been separated, and in which consequently the per centage of starch is much larger.

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TABLE VIII.

AVERAGE OF ORGANIC SUBSTANCES IN THE MORE COMMON CROPS.

	Wheat.	Oats.	Rye.	Indian Corn.	Rice.	Peas.	Potatoes.	Turnips.	Meadow Hay.
Water,.....	15	16	12	12	13	14	75	88	16
Starch,.....	42	37	40	40	70	42	15	7*	4
Gum and Sugar,.....	19	6	14	6	4	6	2	2	12
Nitrogenous substances,...	15	16	13	17	7	24	2	1¼	7
Oil,.....	2	6	3	9	1	2	¼	¼	23
Woody fibre,.....	15	15	16	14	4	9	4	2	50
Ash,.....	2	4	2	2	1	3	1¼	1	8
	100	100	100	100	100	100	100	100	100

* Here, it will be remembered that pectine occurs, in place of starch.

APPLICATION OF THE CROPS IN FEEDING.

OF THE CONNECTION IN COMPOSITION BETWEEN THE PLANT AND THE ANIMAL.

We have hitherto said little as to the direct connection between the composition of the food, and that of the animal. That there is such a connection, must by this time have become clear to every attentive reader. It is, however, even more direct; and the conclusions to be drawn from this directness are more practical than could have been supposed before any chemical investigations were made. Something has been mentioned before as to the similarity between the inorganic substances in the plant and those in the animal: it was explained that they only differ in the fact, that the ash from animal substances contains at most but a mere trace of silica, a substance which will be remembered as forming so important a part of the ash from plants.

In the organic part of animals, we find in many points a not less striking coincidence, with the organic part of plants. It is to be recollected, that in speaking of the nutritive properties of plants, much importance was ascribed to the bodies containing nitrogen, such as gluten, albumen, legumin, etc.

a. These and a number of others having a similar character, have been classed together by some chemists under the name of *protein bodies.* They are, in many cases, widely different in form and properties, but all have about the same proportion of nitrogen, and the same general composition.

b. As we come to examine the flesh, the blood, the hair, and the organic part or gelatine of the bones, we find that from all of them can be extracted various substances that contain nitrogen. When these substances are subjected to chemical analysis, they are proved to belong to

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the same class, and to have a composition agreeing with that of the nitrogenous or nitrogen-containing bodies of the plant.

This is a very striking fact, when we come to consider its various bearings. The gluten of wheat, the legumin of peas and beans, all the nitrogenous bodies of the other grains and roots are actually the same thing as the nitrogenous bodies contained in the muscle, the blood, the hair, the skin and the bones of the animal. The plant, then, is a species of manufactory, where food is prepared in such a form, that the animal can build up its own body with the least possible trouble. These nitrogenous substances are carried by the blood to each extremity of the frame, and are deposited to fill up, supply, or enlarge every part, as may be needed. The fact has long been established, that our muscles, our hair, our skin, and even our bones, are constantly undergoing a change Some of their particles are each day carried away, and rejected from the body in various forms, their place being supplied from the constituents of the food eaten. In this way, particle by particle, the whole body is in time renewed.

When eating meat, we only eat a more concentrated form of protein or nitrogenous substance: all that there is containing nitrogen in bread, is the same body as that which we find in meat, the only difference being, that in bread, there is much less of it in proportion to the whole bulk. It may therefore be said with truth, that in eating bread, we are in one sense, eating the same thing as beef or mutton.

a. If the proportion of nitrogenous substance is very small, as in the turnip or potato, the quantity eaten must be greatly increased. In order to make as much muscle in the body as would be added to it by five or six ounces of meat, in its ordinary cooked form, it would be necessary to eat at least one hundred ounces of turnips or potatoes in their raw state. When cooked, the proportion of water in them would probably be decreased somewhat, and with the seasoning employed to make them palatable, a less quantity might answer.

OF RESPIRATION, STARCH, SUGAR, GUM, AND FAT.

The use of starch in nutrition, has already been briefly alluded to. We have seen that it is one of the most abundant of all the ingredients, in most varieties of vegetable food; and the question naturally arises, what is the necessity, in the animal economy, for this large quantity of such a substance.

a. Starch, as has been previously explained, consists of carbon and water, or carbon united with hydrogen and oxygen, in the proportions to form water. This is brought into the lungs by the blood

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after digestion, and there, or afterward in the blood, undergoes what may be considered a species of combustion.

b. The carbon of the starch unites with oxygen, and forms carbonic acid. This accounts for the increased quantity which, as will be remembered, is found in the air after it has passed through the lungs. The lungs are full of little cavities, so that the blood may come in contact with as much of the air as possible at once, and absorb large quantities of oxygen.

c. Another result of this decomposition or burning is water, so that we have here carbonic acid and water for the final product, as in ordinary burning of wood or coal. We do not understand how it happens, but the same effect seems to be produced in the lungs as when carbon is actually burned by a flame; its uniting with oxygen and forming carbonic acid, heats the body as an internal flame would do. Every person knows how difficult it is for a hungry man to keep warm in cold weather, and how soon a full meal restores the animal heat. The quicker we breathe, the more food or starch is burned; thus strong exertions always heat us, because they compel us to breathe faster. The larger portion of the starch, then, which is received with our food passes off in the shape of carbonic acid and water.

In warm weather, our appetites are less than in cold, because the outward temperature is such as requires less action of the lungs to retain the warmth of the body, and consequently involves a smaller consumption of food. Nothing reduces the flesh and strength so rapidly as cold and hunger combined, for then all the resources of the body are most speedily exhausted. Deprivation of food, while the temperature of the air corresponds nearly with that of the body, may be borne with comparative impunity, and little emaciation, for a period that would in the first case have been fatal.

There are other substances in our ordinary food, which may serve the same purpose as starch, in keeping up the heat of the body.

a. One of these is sugar, as indeed might be expected from the identity of its composition with that of starch; it also consisting of carbon, with hydrogen and oxygen in the proportions to form water. Sugar, when not taken in too large quantities, must be considered a wholesome food, particularly as supplying material for keeping up the heat of the body. Some authors have condemned it, because animals would not thrive on it alone; but this is no argument at all. The same result would follow feeding upon any other single article, to the exclusion of all others. The animal requires, and must have a mixed food, or it will not thrive.

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b. Fatty and oily substances have the same function to perform; they also consist of carbon, hydrogen and oxygen, and in animals that do not eat vegetables, are undoubtedly the chief source by which carbon is supplied to the lungs. When food fails, fat from various parts of the body is first used to support respiration; hence results the remarkable emaciation which appears after long abstinence, or during starvation.

Fat is extremely useful in the body for various purposes. It lubricates and smooths the joints, the muscles and the tendons, so that they play easily and freely; it fills up hollows, making the body plump and rounded, instead of angular and full of disagreeable cavities, as it would otherwise be. This necessary part of the animal is chiefly derived from the oily and fatty substances in the food. It seems clear that, under certain circumstances, both starch and sugar may and do produce fat. This is partially the case when the food consists entirely of potatoes, or when it is nothing but apples. Still we see that those varieties of food which contain most oil, fatten animals quickest.

a. Indian corn is an instance of this: linseed cake is a still more striking one. Such food not only supplies the usual daily waste of the body, but causes an accumulation and increase of fat. The natural supply of ready made oil or fat thus furnished, suits the animal better than the conversion of starch or sugar into fat, as being much easier, more natural, and more readily accomplished.

b. The organic food must then, in order to meet all the wants of the animal, contain starch, sugar or gum, fatty matter or oil, and nitrogenous compounds. These are all organic bodies. The first three are needed to furnish carbon, to be consumed in respiration for the purpose of keeping up the animal heat, and also for making fat in case of necessity. The oil is of value for forming fat directly, and the nitrogenous substance for the production of muscle, cartilage, etc.

c. Among the inorganic parts of the food, *phosphate of lime* should be prominent, in order that the animal may form its bones strong, and of full size. Potash and soda should also be present in considerable quantity. I mention phosphate of lime particularly, because no other phosphate will answer the purpose of making bone. Experiments have been tried by feeding birds with food containing little or none of this, but an abundance of other phosphates. They gradually became thin and died, and it was found that their bones were all wasted away and weak, for want of the necessary material to build them up.

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OF FEEDING THE YOUNG AND GROWING ANIMAL.

We see from the facts already stated, that with the knowledge now gained upon this subject, feeding may become a science; we may modify our food according to the end that we desire to attain.

Let us consider first the young and growing animal. What is the system too often pursued? The best hay, the best shelter, the best litter, all of the grain and roots, are bestowed upon the working or the fattening animals. The young ones have poor shelter, coarse bog hay and straw for fodder, and little care of any description. In the main, they are left to shift for themselves, with poor food and imperfect accommodations, frequently with no accommodations at all, unless the warm side of an old old stack of bog hay, or bleached cornstalks, can be so called. As they crowd together under its shelter from the wind, and eat some of the hay or stalks to keep from starving, the owner congratulates himself on the saving of food that he is effecting. I would ask him to consider whether this is really the best possible practice, and think it will not be difficult to show that every hour of this fancied gain, is in reality a positive loss. It can be made evident from the following facts: The young animal is, or should be, growing rapidly; its muscles should be developing and increasing in size; its bones growing and consolidating; its whole frame enlarging from day to day, in a rapid and almost perceptible manner. This is not to be effected by such treatment as that described above. The real need at this time is for remarkably strengthening and nutritious food—a food that should contain a large proportion of nitrogen in some form, so as to increase the muscles; and of phosphates, to strengthen and enlarge the bones.

The daily waste of the body is proportionally much larger in the young animal than in the old; for, with a more active circulation, all parts of the body change their constituent particles more rapidly. Quite young animals, it is said, often renew their whole bodies in the course of a single year. Beside this larger waste, there is the daily increase in bulk of every part to be attended to; the food, therefore, should be nutritious enough for both purposes.

a. In England, young calves often have a small portion of linseed meal fed to them with milk, this meal being rich both in nitrogen and in phosphates. Fat is not of so much consequence, unless in feeding calves for market. It has been suggested that bone meal, ground fine, might be found good for young animals, as a portion of their allowance; but I am not aware if it has ever been tried with success. It is said

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that the Arabs make use of it for food in time of scarcity. Bean meal or pea meal, in small quantities, makes an excellent mixture with milk.

The natural milk of the mother combines all the properties which I have mentioned, as will be shown hereafter; but it is not always practicable or profitable to feed with milk entirely.

From the composition of the grains previously given, it is obvious that all of them are valuable food for young stock. Indian corn being cheapest, and on the whole best adapted for the purpose, is most used in this country.

Such directions as these, contrast somewhat strongly with the state of things described first; where the animal, shivering in the winter's cold, was compelled to exist on food entirely unsuited to its wants, and scarcely sufficient to supply material for keeping up the heat of its body. Let any reasonable man decide which system will produce the best results.

OF FEEDING THE FULL-GROWN ANIMAL.

The full-grown animal has its bones, its muscles, and all of its parts fully developed and matured. That which it needs in its food, is the material to make good the daily waste of its body. This waste is not inconsiderable, especially when the animal undergoes much labor and severe exertion.

a. A man consumes in respiration alone, from six to eight ounces of carbon in each twenty-four hours. In order to supply this, he must eat about one pound of starch, sugar, gum, fat, or other food rich in carbon. Then there are the phosphates, the nitrogenous substances, the saline bodies, the fat, etc., which will require a number of ounces more.

b. In very cold climates, the amount of necessary food, especially of that which furnishes carbon to keep up the heat of the body, is vastly augmented. The Esquimaux, and other savage tribes living in the arctic regions, eat quantities of fat, tallow, and oil, which would be considered quite incredible, were it not for the concurring testimony of numerous travellers. Several pounds of such food at a time, a dozen or two of tallow candles for instance, or half a gallon of whale blubber, seems to scarcely satisfy their appetites; and this enormous eating appears not to produce the slightest ill effect, as it does no more in that climate, than keep up the requisite animal heat, in addition to supplying the waste of the body.

In warm weather, the quantity of food needed to supply strength for the same amount of exertion, is, as all know, greatly reduced; the appetite often disappears almost entirely, and yet there is no feeling of weakness in undergoing labor. The temperature of the air is so ele-

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vated, that comparatively a very small portion of the food is used in keeping up the animal heat. We shall hereafter consider the particular bearing of these facts on feeding.

OF THE FATTENING ANIMAL AND ITS FOOD.

Hitherto we have spoken only of the young or growing, and of the full grown animal; it now remains to say something of the fattening animal. Here the object of feeding is changed: it is not intended to increase the size and weight of its bones and frame, for these have attained their full development; their daily waste is to be fully replaced, and in addition there is to be the greatest possible amount of flesh and fat accumulated upon them in the shortest possible time, and this with the least necessary cost.

Here is clearly a new class of food needed, containing not only phosphates, saline substances, starch, etc., as before, but also an increased proportion of protein bodies, and above all an abundance of oily or fatty matters. The vegetable fats or oils, as has been said, do not greatly differ in their composition from the animal fats, some of them, in fact, being almost identical: of course, then, the transformations necessary to convert them into the various parts of the body are easily accomplished.

It has been argued by some scientific men, that these vegetable oils are really of not so much importance as is here ascribed to them: they say that the chief part of the fat in our domestic animals is derived from the starch and sugar contained in their food. The fact already mentioned, that both of these substances may be converted into fat, and doubtless are so converted to a large extent, might seem to countenance such views, had we not direct practical evidence that the vegetable food which is most oily in its nature, is found to be most valuable in fattening. It is only necessary to instance Indian meal, oil cake, linseed jelly, etc., as compared, weight for weight, in feeding, with rye, oats, barley, potatoes, or turnips. All experience shows that the first named varieties of food are by far the best.

Starch, sugar, and gum, especially the two latter, unquestionably aid materially in fattening, and will fatten where there is little else given, but at the same time not so speedily or economically as more oily food would have done. A small portion of this latter food, mixed with larger quantities of the more watery or less concentrated nutriment, is found an extremely good way of feeding. Thus, in England, for an ox, as many turnips as the animal will eat, are given, with four or five pounds of oil cake per day. They also use linseed jelly made by boiling the linseed in water, and then mixing with cut straw and hay:

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when it cools, a stiff, firm jelly is formed, which may be turned out in masses. The mixture might well be tried in this country.

a. It is now becoming the practice here to use Indian meal for mixing with moistened cut stuff, and there is great advantage in so doing; an advantage in the readiness and relish with which the animal takes its food, and also of course in the effect upon its growth.

A cutting machine saves much hay, enables the farmer to consume a large portion of straw by mixing with hay, and at the same time to promote the fattening of his stock, by the greater ease with which they eat and digest food already partially prepared for their stomachs. I shall soon mention why it is that every thing which saves labor to the fattening animal, promotes the increase of its bulk. Hay for such purposes should be mown before quite matured, as for the reasons explained in a previous chapter, it contains so much more gum, sugar, etc., than when allowed to stand till fully ripe. The same practice is good with straw. We have already seen that the grain is heavier and better in quality for early cutting; and experience shows that the straw is not less superior for feeding purposes. Some kinds, cut early and carefully cured, are nearly equal to certain varieties of hay, and even superior to most of that which has been suffered to ripen and bleach till it is little better than a mass of dry sticks.

Indian cornstalks, when cut as above, and well cured, make a most admirable fodder. They are then sweet and nutritious in an eminent degree. When cut fine, and mixed with Indian meal, are eaten by cattle with much avidity, and eaten clean, butts and all. Some farmers think that really good stalks are worth about as much as the best hay. When we consider the weight of them to be obtained from an acre of heavy corn, they are probably more than equal, taking into account the respective quantities per acre.

In many parts of this country, cornstalks are neglected, or, if carted at all, are only thrown into the barnyard whole. Their butts and stalks come out undecayed in the spring, making the manure difficult to handle or spread, and worse still to plow under. We see hundreds of fields every autumn, where the stalks stand bleached and white till just before snow comes, when perhaps they are carted into the yard as just described, or stacked for the benefit of such unfortunate young stock as may be starved into the idea that they are a tolerable article of food.

When made into small stacks in the field, with the butts well out so as to let air in, and the tops tied together, they dry green, and sweet, and tender, so that all stock relish them highly. Some farmers leave the stalks of one hill uncut, and gather those of eight to sixteen others

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around it. The center hill gives stability to the stack, and prevents it from blowing over.

ON THE SOILING OF STOCK.

The practice of feeding various crops to cattle, while they are green, or of soiling, as it is otherwise termed, has excited some attention of late years, and it is therefore proper to devote a few words to it here. The advocates of such a course contend: 1. That the food from an acre goes farther; 2. That the animals thrive better; 3. That their manure is more perfectly preserved.

a. This latter position is unquestionably a true one; the manure being under cover, is not exposed to evaporation or washing, and is without doubt not only more valuable, but is retained in greater bulk.

b. It is probably true, also, that the green food from an acre, goes much farther than the same amount would do when dried. I suppose that it is impossible to make hay or fodder from any green crops, without to a considerable degree changing their composition, thus rendering them, to a certain extent, hard and indigestible; some parts, which before were soluble, becoming in drying nearly insoluble.

c. As to the animals thriving better, that is a point which I consider as not yet fully decided. It is a question if, in our extremely hot climate, animals do so well during the warm weather of summer, confined in close sheds, pining for liberty and green fields. I think that we require extended experience, and many comparative experiments, before this question can be regarded as finally settled.

A modification of the system would without doubt be successful in certain situations, such as where the ordinary pasture would admit of being partly cultivated, or had some arable field close at hand, in which might be grown indian corn sown thick, heavy crops of clover, or some other form of green fodder. A portion of this, cut twice a day, and fed out upon the pasture, would have an excellent effect, both on the condition of the animals, and in the improvement of the pasture. Green food given in this way keeps working cattle in good order, and dairy cows in rich milk, through the hot months. All of the crop is available, no part of it being lost by the trampling of stock. One man with a scythe can cut enough in a few minutes, morning and evening, to supply a very considerable herd.

ON THE KEEPING OF STOCK DURING WINTER.

The place in which stock is kept during winter has a much more important effect, not only upon their condition, but upon the quantity of

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food that they eat, than is usually imagined. Suppose it to be in an unsheltered yard, or on a hill-side, open to cold winds and driving storms; from what has been already said, we know that in such a situation, the action of the lungs will be increased as the temperature of the body decreases. This will call for an augmented supply of carbon from the food, using up the starch, sugar, oil, etc., which would otherwise have gone to cover the frame with fat. Thus a large portion of the food is consumed or burned in the lungs and blood, to keep the body warm. As the animal grows poorer under this condition of things, it becomes less and less able to resist the cold, so that at last about all of its nutriment is used up, in the action necessary to keep it from freezing.

The animal that has a sheltered yard with plenty of litter, with sheds facing to the south, for the day, and good stables and other shelter for the night, is constantly warm and comfortable; for these reasons respiration does not need to be so rapid, and the larger part of its food goes to the support and increase of its body. Under such circumstances, we might expect a smaller quantity of nourishment to produce a greater increase of weight, and this is found to be actually the case.

The amount of exercise taken, has also much influence. When animals are fattening, the less exercise of a violent nature that they take, the better; for every exertion increases the depth and freqency of breathing, and so of course, makes a draft upon the food. The more tranquil and quiet the state, then, in which the animal is kept, the more readily will fat accumulate.

a. This is shown by the well known fact, that turkies, pigeons and other fowls, when shut up in the dark, will fatten with very great rapidity. In such a situation, they are kept perfectly still; there being no object to distract their attention, and make them restless, they have nothing to attend to but eating, sleeping and digesting.

Some experiments have also been made, on the advantage of fattening animals by feeding in confinement, as contrasted with others at liberty. In Prof. Johnston's Lectures, are given the results of an experiment made upon sheep, by selecting those of nearly equal weight, and feeding for four months under different circumstances. One was entirely unsheltered, another in an open shed, another still in a close shed and in the dark. The food was alike, 1 lb. of oats each per day, and as many turnips as they chose to eat.

a. The first sheep consumed 1912 lbs. of turnips, the second 1394 lbs., and the third 886 lbs., or *less than half* of those eaten by the first.

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b. The first one gained 23½ lbs. in weight, the second 27¼ lbs., and the third 28¼ lbs.

c. For every 100 lbs. of turnips eaten, the first gained in weight 1¼ lb., the second 2 lbs., the third 3 1/16 lbs. This is a most striking example of the effect of warmth and shelter; the one kept in a close shed and in the dark, eat less than half as much, and gained more than the unsheltered one.

Another remarkable instance is given by Prof. Johnston. Twenty sheep were kept in the open field, and twenty others of nearly equal weight, kept under a comfortable shed. They were fed alike for the three winter months, having each day ¼ lb. linseed cake, ½ pint barley, with a little hay and salt, and as many turnips as they wished to eat. "The sheep in the field consumed all the barley and oil cake, and about 19 lbs. of turnips each per day, so long as the trial lasted, and increased in the whole 512 lbs. Those under the shed consumed at first as much food as the others, but after the third week they eat 2 lbs. each of turnips less per day; and in the ninth week 2 lbs. less again, or only 15 lbs. per day. Of the linseed cake they also eat about ¼ less than the other lot, and yet increased in weight 790 lbs., or 278 lbs. more than the others."

This too was with nearly 200 lbs. less of oil cake, and about 2 tons less of turnips, according to the above statement. Are not such facts as these worthy of attention? Here it is shown by practical experience that theory is correct; that when animals are unsheltered and cold, they eat more and gain less, because so large a portion of their food is used up in keeping them warm.

In the course of a very few years, such differences as these, to a farmer who kept much stock, would save the entire price of good, substantial sheds. The comfort and warmth of animals, should be a primary consideration in the construction of sheds and stables of every description. It is quite easy, by a little study, to unite these important requisites with convenience, and with economy of time in feeding. When buildings are well regulated in these respects, a man can do much more work, and do it better, than where he has to accomplish every thing at a disadvantage, as is the case in too many establishments. From the results hitherto obtained by feeding in the dark, and in close buildings, it would be well to try this system on a large scale. Many persons partially adopt it by using folding shutters, which render the light of day quite dim and indistinct. Where many animals are in the same building, care should be taken to ensure good ventilation.

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OF THE FORM IN WHICH FOOD IS TO BE GIVEN.

The state in which food is given, has an important bearing on the effect which it produces, in sustaining or fattening the animal. I have already spoken of cutting hay, straw, and stalks, and have explained the advantages which result from the practice. On small farms, all that is necessary may be cut by hand in an hour at night and morning; and where the stock is large, there is always, or ought to be, a horse power; by connecting this with a cutter, the work may be done with equal ease.

For milch cows, this cut stuff is as advantageous as for fattening animals. If wet a little previous to feeding, and indian meal or other ground feed sifted over in small quantity, the cows will eat it with great relish, and the effect of the meal will be quite apparent in the richness of their milk. Some such food is in fact necessary to supply the nitrogenous substances, the butter, and the phosphates which milk contains so largely.

a. A half bushel of sugar beets, parsnips, or carrots, to each cow daily, will be found an excellent addition to their food; it gives sweetness and richness to the milk, making the butter of a yellow color, even in winter. If these roots are cut by a root-slicer, they will be eaten cleaner, and more easily digested, as the animal can then without difficulty grind up each piece separately.

It is with milch cows as with fattening animals; quiet and warmth affect the quantity and quality of milk, as much as they do the accumulation of fat. All that the cow uses in breathing after exertion, or to keep herself warm, is so much withdrawn from the milk. Here then also, good shelter, and comfortable feeding places, are the best economy. In fact, this rule applies to every class of stock. From what was said in the last chapter, with regard to young and growing animals when exposed to cold, it is clear that they as well as others, need shelter and warmth, that their food may be of the greatest benefit in increasing their growth.

Cooked food, in various forms, is found to be of great value in feeding. The same quantity will, in many cases, go farther cooked than raw. This is especially true of many roots, as potatoes, carrots, etc.; also, of every kind of meal, of pumpkins, squashes, apples, etc. When cooked, the animal eats its food more readily, and a smaller quantity goes farther. This does not apply to all kinds of animals. According to some experiments, horses, for instance, throve little, if any, better on cooked food than on raw. In some of the trials, the raw food seemed

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to have the advantage. This is not, however, to be regarded as a general rule.

It has been said that starch may be changed into sugar and gum in various ways: the application of heat is one of these ways; and in cooking food, this change by means of heat doubtless takes place to a very considerable extent. The starch is not soluble in water, while the sugar, dextrine, and gum, thus formed during cooking, are eminently so: the cooked food is therefore more easily dissolved and digested in the stomach of the animal, and is moreover eaten without any exertion. This ease and quickness of digestion, seems to have the same effect upon many classes of animals in hastening their growth, that has been before exemplified, with regard to some powerful and quite soluble manures applied to plants. It was shown that easy solubility, and therefore quickness of action, were more important than quantity; for instance, that two or three bushels of bones, dissolved in sulphuric acid, would benefit a crop more than sixty or seventy bushels of whole bones. So with the animal; a small portion of food, which it can at once eat, digest, and make into its own bones, muscle, and fat, is worth more than a large quantity of some kind which it can only eat with difficulty, and digest slowly. Turnips and parsnips are usually fed raw; but potatoes, pumpkins, apples, and meal, are varieties of food which are almost always better to be cooked, where it is practicable.

Every farmer should endeavor to have a cellar fitted for the purpose of keeping roots where they would neither freeze, nor be so warm as to sprout. It is better to have the temperature a little too cold, than a little too warm. In the latter case decay will speedily commence, and towards spring, when the roots begin to sprout, their value will rapidly decrease; all their more valuable and soluble parts being abstracted by the shoot, leaving little more behind than woody fibre and water.

In England, a system of feeding with a species of linseed jelly, has been very highly spoken of during the last few years. Linseed is thoroughly boiled in water, 1 lb. to 2 gallons; and when the water is sufficiently concentrated, the whole is poured into little boxes; then as much fine-cut straw as convenient is added, and the whole thoroughly stirred together. As the mixture cools, the linseed forms the contents of each box into a mass of stiff jelly, capable of being turned out and of retaining its shape; it is fed to cattle in that state. This is an extremely nutritious, and also a very fattening food. Sometimes a little bean or peas meal is also stirred in; either of these make the compound richer in nitrogen, and therefore better adapted to the formation of

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muscle. The results of this system of feeding have been entirely satisfactory, so far as we have any reports of its success.

Cooked food, allowed to sour, has been found in many cases remarkably fattening, particularly as fed to swine. The souring should, of course, not be allowed to go on to the extent of strong fermentation. It is probable that the efficacy of this soured food, is due to a still farther action upon the starch, than the one noticed in a preceding paragraph. Not only has heat the power of converting it into sugar, gum, etc., but certain acids also.

a. By mixing a certain portion of dilute sulphuric acid with starch in weighed quantity, and exposing it for some hours to a gradual temperature, we are able to produce sugar; the starch has been changed by the acid. This is done on a large scale in France.

b. In the souring of food certain vegetable acids are formed, which possess the same power as sulphuric acid: it is even probable that some portions of the otherwise indigestible woody fibre, are also changed into a sweet gummy substance, for this is another transformation that we are able to effect by artificial means. The result of souring then, is to bring the cooked food, already partially altered, into a still more soluble and digestible state. Probably no animal but the hog would be fond of such food; but for him, it is easy to see that it would prove valuable.

If the souring is allowed to go too far, still another change takes place, by means of which all of the sugar is converted, through fermentation, first into alcohol, and finally into vinegar; in neither of these states would the food be nutritious, even if animals could be induced to eat it.

ON THE DIFFERENCES IN CERTAIN CLASSES OF MANURE.

We are by this time fully able to understand the difference in the manures derived from different classes of animals, the young, the full grown, the fattening, etc.; I will, therefore, now touch once more upon that subject.

We have seen that the young animal is not only constantly increasing in its bulk, but that it is renewing every part much more rapidly than those of mature age. Food is for both of these reasons required, not only to supply the large daily waste, but also to build up the growing bones, muscles, and all other parts. Hence it results, that nearly every thing of value in the food will be appropriated, and the manure will be chiefly composed of indigestible substances; little being rejected that can be made to aid in increasing the body or frame.

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a. In the milch cow, we have a still stronger instance. Here every thing available goes to the secretion of milk; even the body becomes thin and emaciated by this constant drain: the consequence is, that the manure is poor and watery, containing only the refuse of the food, with the small waste of the body. These two kinds of manure, from the milch cow, and from the rapidly growing animal may be considered poorest of all.

Manure from full grown working animals, is usually of excellent quality. If they work steadily, their food must be good in order to keep them in condition; of the carbon contained in it, so much as necessary, and this of course the largest part, owing to the amount of exercise that they take, is used in breathing; and for this reason the manure is as it were concentrated, and is rich in nitrogen, in phosphates, and the saline substances of the food generally. All that is above the daily supply to keep up the body, and the bones, comes into the manure.

In fattening an animal, the aim is simply to increase the bulk of its flesh and fat, the bones have attained their full size already. By far the greater part of the fatty matter in the rich food given, is in this case appropriated to the increase of the body, beside a large portion of the nitrogenous substances also; but a goodly quantity of both still goes into the manure, and it is rich in inorganic materials.

These two last varieties of manure, from full grown, and from fattening animals, should be preserved with much care. It is proper for the farmer to remember, that in feeding his stock well, he is not only increasing their weight, but is also benefiting his land for the future, by the rich and powerful manures which they produce when well fed. Some of the best English farmers are accustomed to consider one load of manure from their fattening stock, equal to at least two, and sometimes three loads, from the sheds and yards where their young stock is kept. This superiority is not a matter of opinion only, but the result of experience.

ON THE EFFECT OF FEEDING UPON PASTURES.

There is one more point to be noticed, in connection with the difference in the portions of food retained by animals, fed at various stages of growth, and for different purposes. This is relative to the different effect produced by them upon pastures.

Where milch cows, or young stock generally, are fed constantly upon a pasture, or meadow, there is a rapid deterioration, particularly as to the inorganic materials of the soil. The milch cow carries away phosphates, and other valuable mineral ingredients, beside nitrogenous

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bodies, in her milk; the young animal does the same, in its augmented body and bones. Their manure, even if all left upon the soil, does not restore more than a small part of that which they take away; and the richest pasture will, after a time, begin to show signs of exhaustion.

The case of a pasture upon which full grown animals are fattened, is quite different. Here all of the phosphates, etc., which are not required for the body, are restored to the soil, and such a pasture may hold out, with little decrease of fertility, for a very long period. If the animals are at the same time, as is usual, fed with rich food from sources foreign to the farm, then the pasture may even improve under such a system of pasturing; the inorganic substances in the soil may actually be increased, rather than diminished, if the food eaten abounds in them. In some parts of England, cattle are fed upon a rich field during the day, and driven to a poor one to pass the night, as a cheap method of manuring.

This is a somewhat different plan from one which is adopted in many of our states, where it is the practice to let droves of cattle on their way to market, upon good pastures, for a single night, or for an hour or two at noon. They usually get little during the day, and of course fill themselves completely from the pasture, depositing little compared with that which they take away. If they were fed at night with grain, or other rich food, then the practice might not be so injudicious. As generally conducted, however, it tends directly to the impoverishment of the pasture. Every such visit unregulated in any way, withdraws a considerable portion of its material for producing flesh, fat, and bones, and of course deducts to a like extent from its actual value. If the farmer can supply the substances abstracted, for a less sum than the drovers pay him, he may then be justified in continuing the system, but not otherwise.

MILK, AND DAIRY PRODUCE GENERALLY.

THE COMPOSITION OF MILK.

This is an important branch of agriculture, and one upon which we have hitherto merely given some passing hints; we will now take it up somewhat in detail.

The appearance and the usual qualities of milk, are too well known to require description here. It differs considerably in its composition as obtained from different animals, but its general nature is similar in all cases. From 80 to 90 lbs. in every 100 lbs. of cow's milk, are water. This quantity may be increased by special feeding for this purpose.

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Some sellers of milk in the neighborhood of large cities, who are too conscientious to add pump-water to their milk, but who still desire to dilute it, contrive to effect their purpose by feeding their cows on juicy succulent food, containing much water; such watered milk they are able to sell with a safe conscience, though it may be doubted if the true morality of the case, is much better than if the pump had been called directly into action.

From 3 to 5 lbs. in each 100 lbs. of milk, are curd or casein; this is a nitrogenous body like gluten, albumen, animal muscle, and the others we have previously named. Casein is a white, flaky substance, and can be separated from the milk in various ways; these will be specified when we come to write particularly of cheese and cheese making. There are also in every 100 lbs., from 4 to 5 lbs. of a species of sugar, called *milk sugar;* this is not so sweet as cane sugar, and does not dissolve so easily in water. It may be obtained by evaporating down the whey, after separation of the casein or curd. In Switzerland, it is made somewhat largely, and used for food.

The butter or oil amounts to from 3 to 5 lbs. in every 100 of milk. Lastly, the ash is from ½ to ¾ lb. in each 100. This ash is rich in phosphates, as shown in the following table; it represents the composition of two samples, each of the ash from 1000 lbs. of milk.

TABLE XI.

	No. 1.	No. 2.
Phosphate of lime,	·23	·34
Phosphate of magnesia,	·05	·07
Chloride of potassium,	·14	·18
Chloride of sodium (com. salt,)	·02	·03
Free soda,	·04	·05
	0·50	0·67

We shall refer to this table again.

The butter, as stated above, is from 3 to 5 lbs. in each 100 of milk. It exists in the form of minute globules, scattered through the liquid. These globules of butter or fat, are enveloped in casein or curd, and are a very little lighter than the milk; if it is left undisturbed, they therefore rise slowly to the surface and form cream. If the milk be much agitated and stirred about, the cream will be much longer in rising; so also if it is in a deep vessel, as a pail, in place of shallow pans. Warmth promotes its rising.

a. There is a little instrument called the *galactometer*, intended to measure the richness of milk. This consists of a series of graduated

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tubes, which, by means of small divisions, mark the thickness of cream that rises to their surface. It is not a correct instrument, for the reason that I have already stated, that cream does not rise so well through a deep column of milk as through a shallow one. The quantity of cream then, indicated by a galactometer, will always fall short of the real proportion which the milk contains. It may sometimes be of use, for comparing the richness of milk from various cows of the same dairy.

When milk is drawn in the usual way from the cow, the last of the milking is much the richest: this is because the cream has, in great part, risen to the surface inside of the cow's udder; the portion last drawn off then, of course contains the most of it. Such a fact shows the importance of thorough and careful milking. In some large dairies, the last milkings from each cow are collected in a separate pail. More milk is said to be obtained from the same cow when she is milked three times a day, than when but once or twice; less when milked once than twice, but in this last case it is very rich.

Some large breeds of cows, are remarkable for giving very great quantities of poor watery milk; other small breeds give small quantities of a milk, that contains an uncommon proportion of cream. These large breeds are kept in many parts of the country about London, for the purpose of supplying the city. By giving them succulent food, the milkmen contrive to increase still farther the watery nature of their milk, as before noticed.

The small breeds have one great advantage: it requires a much less quantity of food to supply the wants of their bodies, so that all over that quantity goes to the enriching of the milk. A weight of food therefore, with which they could give good milk, would only suffice to keep up the body of the larger animal, and the milk would consequently be poor and watery. This is probably one chief reason, why the milk of the small breeds generally excels so decidedly in richness.

OF BUTTER.

We are now to consider the various methods of making butter, and some of the questions connected with its preservation. The object in churning, is to break up the coverings of the little globules of butter: this is done by continued dashing and agitation: when it has been continued for a certain time, the butter appears first in small grains, and finally works together into lumps.

a. Where cream is churned, the best practice seems to be, to allow of its becoming slightly sour: this sourness takes place in the cheesy

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matter, or casein, that is mixed in the cream, and has no effect upon the butter beyond causing its more speedy and perfect separation.

b. In many dairies the practice is to churn the whole milk. This requires larger churns, and is best done by the aid of water or animal power; it is considered to produce more butter, and this is said by some to be finer and of better quality. I do not think that there have been any very decisive experiments upon this point.

The excellence of butter is greatly influenced by the temperature of the milk or cream, at the time of churning; if this be either too hot or too cold, it is difficult to get butter at all, and when got, it is usually of poor quality. A large number of experiments have been made with regard to this point, and the result arrived at is,—that cream should be churned at a temperature, when the churning commences, of from 50 to 55 deg. of Fahrenheit's thermometer. If whole milk is used, the temperature should be about 65 deg. F. at commencing. In summer, then, cream would need cooling, and sometimes in winter a little warmth. It is surprising how the quality of the butter is improved by attention to these points. I have seen churns made double, so that warm water, or some cooling mixture, according as the season was winter or summer, might be put into the outer part. It will be seen, that in whatever way the temperature is regulated, a thermometer is a most important accompaniment to the dairy.

The time occupied in churning, is also a matter of much consequence. Several churns have been exhibited lately, which will make butter in from 3 to 10 minutes, and these are spoken of as important improvements. The most carefully conducted trials on this point, have shown that as the time of churning was shortened, the butter grew poorer in quality; and this is consistent with reason. Such violent agitation as is effected in these churns, separates the butter, it is true, but the globules are not thoroughly deprived of the casein which covers them in the milk; there is consequently much cheesy matter mingled with the butter, which is ordinarily soft, and pale, and does not keep well. Until the advocates of very short time in churning can show that the butter made by their churns, is equal in quality to that produced in the ordinary time, farmers had better beware how they change their method, lest the quality of their butter, and consequently the reputation of their dairy, be injured.

Butter contains two kinds of fat. If melted in water at about 180 F., a nearly colorless oil is obtained, which becomes solid on cooling. If the solid mass be subjected to pressure in a strong press, at about 60 F., a pure liquid oil runs out, and there remains a solid white fat. The liquid fat is called *elaine*, and the solid fat, *margarine*. These two

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bodies are present in many other animal and vegetable oils and fats. They are both nearly tasteless, and when quite pure, will keep without change for a long time. In presence of certain impurities, however, they do change.

If great care is not taken in washing and working, when making butter, some buttermilk is left enclosed in it; the buttermilk, of course, contains casein, the nitrogenous body which we have already described; there is also some of the milk sugar before mentioned. The casein, like all other bodies containing much nitrogen, is very liable to decomposition. This soon ensues, therefore, whenever it is contained in butter; and certain chemical transformations are by this means soon commenced, whereby the margarine and elaine are in part changed to other and very disagreeable substances; those which give the rancid taste and smell, to bad butter. The milk sugar is instrumental in bringing about these changes. It is decomposed into an acid by the action of the casein, and has a decided effect upon the fatty substances of butter, causing them to become rancid. This action and consequent change comes on more or less rapidly, as the temperature is warmer or colder.

No matter how well the butter is made in other respects, if buttermilk be left in it, there is always, from the causes above mentioned, a liability to become rancid and offensive. When packed in firkins, it will be rancid next to their sides and tops; will be injured to a greater or less depth, as the air may have obtained access. Salting will partially overcome the tendency to spoil, but not entirely, unless the butter is made so salt as to be hardly eatable. Another reason for much of the poor butter, which is unfortunately too common, is to be found in the impure quality of the salt used. This should not contain any magnesia or lime, as both injure the butter; they give it a bitter taste, and prevent its keeping for any length of time. Prof. Johnston mentions a simple method of freeing common salt from these impurities. It is to add to 30 lbs. of salt about 2 qts. of boiling water, stirring the whole thoroughly now and then, and allowing it to stand for two hours or more. It may be afterward hung up in a bag, and allowed to drain. The liquid that runs off is a saturated solution of salt, with all the magnesia and lime which were present. These are much more soluble than the salt, and are consequently dissolved first.

Want of caution as to the quality of salt used, and of care in separating the buttermilk, cause the spoiling of very great stocks of butter every year; a large part of that sent to Europe is sold for soap grease, and for other common purposes, simply because these points have been neglected.

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OF CASEIN IN CHEESE.

Cheese is made from the casein of milk; this casein or curd, is separated from the whey by means of rennet; the same thing may be done by small quantities of acids, as acetic or hydrocholoric acid; and if the milk be allowed to stand long, it will be done naturally by the formation of what is called *lactic acid*, from the milk sugar. The appearance which the curd of milk, or the casein presents, when curdled either by rennet or an acid, is so well known as to render any description unnecessary.

a. In the analyses of the ash from milk, Table XI., was mentioned a small quantity of free soda. This being dissolved in milk, keeps the casein likewise in solution; but when any of the acid substances mentioned above are added, they immediately unite with and neutralize the soda; the liquid then of course becomes acid, so that the curd falls down at once. Rennet is not supposed to do this by acting as an acid, but by promoting the formation of an acid in the milk itself, which does the work. The milk is thus made to curdle by the action of its own acid.

This is not the place to enlarge upon the practical methods of cheese making, nor upon the endless varieties of cheeses to be found in this and other countries. Scarcely any two districts have a similar practice in their manufacture, or produce an article at all identical in its taste or appearance. Those of some districts would be considered the reverse of excellent in others. For instance, a variety most highly valued in Paris, has undergone an incipient putrefaction, so as to evolve ammonia.

The richest cheeses are made by adding the last night's cream to the morning's milk. Such are the Stilton cheeses of England; from these we have them all the way down to skim milk, and, in some counties of England, to those which are made from milk that has been skimmed for three or four days in succession. Such as these are perfectly hard and horny. The following table from Prof. Johnston's lectures, gives the composition of several English and Scotch varieties of cheese.

TABLE XII.

In 100 lbs.	No. 1.	No. 2.	No. 3.	No. 4.
Water,	43.82	35.81	38.58	38.46
Casein,	45.04	37.96	25.00	25.87
Butter,	5.98	21.97	50.11	31.86
Ash,	5.18	4.25	6.29	3.81

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No. 1 represents a skimmed milk cheese: it will be seen that the proportion of butter is very much smaller than in Nos. 2, 3, and 4; it is, however, weight for weight, more nutritious than any of the others. It will surprise most persons, to know that cheese contains from 1-3 to 1-2 its weight of water; and that in eating very rich cheeses, fully 1-3 of what they eat is butter. No. 4 is a rich Ayrshire cheese, of the kind with which some of our American dairies come especially into competition. This was a particularly fine sample. Cheese, judging from the above analyses, is both a very nutritious and a very fattening food. The richness of the finer varieties, prevents their being eaten in large quantities. On skim milk cheese, such as that in the first column, a man might live very well as a principal article of diet.

It will be noticed that all of these cheeses contain a considerable proportion of ash: this ash is more than half phosphates, chiefly phosphate of lime; of the remainder a large part, as might be supposed, is common salt, that has been added to the cheese in curing. In various districts there are different ways of introducing the salt. In some cases it is all put in before the cheese is pressed; in others it is all absorbed from the exterior, after the cheese is made. This will not do for very thick cheese. In making these, a portion of the curd is sometimes doubly salted, and placed in the centre; the intention being to ensure that the salt absorbed from the exterior shall penetrate till it meets the part already salted, so that no part of the cheese shall escape.

The temperature of the milk at the time when rennet is added, for the purpose of curdling it, is a matter of much importance to the quality of the cheese. The best authorities prescribe from 90 to 96 deg. of Fahrenheit.

a. Great care should be used in expelling the whey from the curd, and afterward from the cheese in pressing, as the milk sugar which the whey contains changes its composition, as it does in butter, and communicates a disagreeable flavor to the cheese; by this means cracks are often formed, and it becomes full of little holes.

b. The use of bad salt is another way of effectually injuring the quality of the cheese, making it bitter, and preventing it from keeping well. The impurities of the salt are here the same as those which were mentioned under the head of butter, in the preceding section; and the method to be adopted for purifying is also the same. Want of care in pressing and working out the whey, the use of bad salt, and neglect as to the temperature at which the milk is curdled, chiefly operate in producing the multitude of inferior cheeses which we find in every market; not destitute of richness, but miserable in appearance and flavor.

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From the composition of the ash of cheese, as just noticed, and that of milk, mentioned before, we can easily see how it is that pastures become poor in phosphates. All that which is sold off in cheese, never returns to the soil; and that fed to fattening animals in milk, is also for the most part lost. Beside the milk which each cow gives for dairy purposes, there is also her annual calf, the phosphates in the bones of which must also come out of the pasture. It is certain that in the bones of the calf, and in the milk, each cow would deprive the pasture of at least 50 or 60 lbs. of bone earth, or phosphate of lime, in each year. For these reasons it is, that bones, as has been indicated, are most likely to prove of great advantage as a manure on worn out pastures, and also on meadows that are used in the autumn for feeding. Applied as dust, or still better dissolved in sulphuric acid, a few bushels per acre (in the latter case two is enough) have been found to produce a most wonderful effect; in many cases doubling and even tripling the value of pastures, within a year or two after the application.

The different properties of milk which have been noticed, suggest one or two hints relative to the feeding of milch cows. We have seen that the quantity of milk may be increased by feeding with watery succulent food. There is no doubt but the quantity of butter would be greatly augmented by feeding in the same manner as for fattening, with food rich in oily or fatty substances. If cheese-making were the object, varieties of food rich in nitrogen, as beans, peas, clover, Indian corn, etc., might be expected to produce a good effect.

In feeding with oily food, care is to be taken that it is not of a nature to communicate any unpleasant flavor to the butter. Linseed cake is an instance of this; a small proportion of it, given with other food, has an excellent influence, increasing the quantity of butter in a marked degree: too much, however, gives a very unpleasant taste. This effect is perfectly natural; as every one knows that all strong tasting food eaten by cows, as onions, leeks, cabbages, turnips, etc., if in considerable quantity, impart a most disagreeable flavor to their milk.

We are now able to understand, how admirably milk is fitted to the purpose for which it is designed, the nourishment of the young animal. In its casein is a substance which furnishes just the material for muscles, tendons, and all the solid flesh of the body.

The butter lubricates the joints, makes the skin soft, and furnishes the fat generally, besides being used in case of necessity for respiration; the milk sugar is equally available with starch, and common sugar, for the purpose of respiration, thus keeping up the heat of the body.

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Finally, in its ash, we have the phosphates for building up the bones, the framework of the body, and other saline substances for supplying the blood and the flesh with their inorganic part.

CONNECTED RECAPITULATION OF THE VARIOUS TOPICS TREATED OF UNDER THE PRECEDING HEADS.

We have now gone over nearly all of the ground that I have thought it advisable to traverse, in a treatise of this character. It may be of advantage, in closing, to give a condensed view of the whole subject, recapitulating the main points that have been illustrated and explained.

This will serve as a species of index, and will, at the same time, recall such arguments and facts relative to the various divisions indicated, as may have been forgotten.

THE ART OF CULTIVATING THE SOIL; WHAT THIS IS, IN ITS PROPER MEANING.

Plants. Great division of them into organic and inorganic substances. Organic bodies burn away; inorganic bodies incombustible.

Names of inorganic bodies: carbon, hydrogen, nitrogen, and oxygen.

Carbon, a solid, of which charcoal, plumbago, and the diamond are forms. Hard, and combustible.

Hydrogen, a gas, colorless, tasteless, inodorous, the lightest body known. Inflammable, explosive when mixed with air, extinguishes combustion, and will not sustain life.

Oxygen, a gas, colorless, tasteless, inodorous, not inflammable; supports combustion most energetically; supports life, both animal and vegetable; unites with nearly all other bodies, and forms oxides; most abundant of all known substances.

Nitrogen, colorless, tasteless, inodorous; does not support combustion; does not burn itself; does not maintain life.

The great importance, and the vast diffusion of these bodies.

THE INORGANIC PART OF THE PLANT.

Consists of potash, soda, lime, magnesia, oxide of iron, oxide of manganese, silica, chlorine, sulphuric acid, (oil of vitriol), phosphoric acid.

1. Potash, common potash, pearlash, caustic potash.
2. Soda, caustic soda, carbonate of soda, for washing.
3. Lime, quicklime, common limestone, plaster of paris, marls generally.
4. Magnesia, calcined magnesia, epsom salts (sulphate of magnesia).
5. Oxide of iron, common iron rust.
6. Oxide of manganese, commercial black oxide of manganese.

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7. Silica, common quartz, flint, agate, cornelian, chalcedony.

8. Chlorine, a gas, of a green color, heavy, suffocating odor; does not burn, but some metals when finely powdered, inflame in it.

9. Sulphuric acid, common oil of vitrol.

10. Phosphoric acid; burn common phosphorus, a white, very sour powder.

These are all present, in cultivated crops, though usually not in large quantity.

SOURCES OF THE FOOD OF PLANTS.

Their organic food comes chiefly from the air.

Carbonic acid, a gas, heavy, extinguishes combustion, fatal to life; no color, slight acid taste, and peculiar smell. Furnishes carbon to plants.

This gas is absorbed from the atmosphere by day, through the leaves and oxygen is at the same time given off; $\frac{1}{2500}$th of carbonic acid exists in the air.

How the supply of it is kept up; combustion, respiration, decomposition.

The hydrogen of plants is obtained from water.

The oxygen comes from water, carbonic acid, and almost every form of food.

Nitrogen is supplied by ammonia and nitric acid.

Ammonia, a gas, gives the smell to aqua ammonia, and to smelling salts.

Nitric acid, common aqua fortis.

OF THE ORGANIC SUBSTANCE OF PLANTS; STRUCTURE OF THE STEM THE ROOTS, AND THE BRANCHES.

Principal bodies which make up the organic part of plants.

Woody fibre, the most abundant of all, in stems, stalks, leaves, etc.

Starch, the leading substance in seeds, and in many tubers.

Sugar. Gum. Oils. Their nature and importance.

These all composed of carbon, hydrogen, and oxygen only, the two latter being in the proportions to form water; the same formula may and does represent them all.

Water consists of hydrogen and oxygen.

The atmosphere consists of nitrogen and oxygen.

COMPOSITION OF THE SOIL.

We find here also an organic, and an inorganic part; the inorganic part largest, contrary to what was observed in plants.

The organic part is derived from the decay of animals and vegetables; the inorganic part from the decomposition of rocks.

The inorganic part consists of the same substances as the inorganic

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part of plants, with the addition of alumina. This is a white substance, which gives stiffness to clays.

A very fertile soil contains *all* of these substances, and that in considerable quantity.

One which is fertile only with the addition of manure, has deficiencies of some substances which the manures added supply.

One which is barren, has nearly everything that is valuable wanting.

The three principal varieties of rocks, are limestones, sand-stones and clays.

Soils may be named, as one or other of these predominate.

MECHANICAL IMPROVEMENT OF THE SOIL.

Nature of the connection between the soil and the plant. Benefit of mixing clay with sand, and sand with clay.

Injuries arising from wetness of the soil. It causes the formation of vegetable acids, and other hurtful substances.

These defects are to be removed by draining.

Drains to be 30 to 36 inches deep, and always covered. If made of stones, they should be broken small; if of tiles, these may be either of the round, oval, or horseshoe shape. The earth to be rammed hard above them in all cases. They ought to run straight down slopes, and be placed 24 to 50 feet apart.

Subsoil and trench plowing; difference in the two operations, and nature of their effect.

The inorganic substances of the soil are found in plants, with the single exception of alumina.

The quantity of some of them is quite small in plants, but all are absolutely necessary.

Effect of cropping upon the soil.

Different crops take away the inorganic substances of the soil in different proportions; their ash also varies in composition.

The grains contain chiefly phosphates.

Potatoes and turnips, mostly potash and soda.

Grasses, for the most part, lime and silica; straws, nearly all silica.

This explains the principle of rotation. One crop may find food when the land has been exhausted for another, and so a succcession may be continued for some years.

The value of land is kept up by such a course for a greatly increased length of time.

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Of manures.

Irrigation, or manuring by running water.

Vegetable manures, their nature. Not so energetic in action as some fertilizers, but very beneficial to the soil.

Green crops for plowing under. These lighten and mellow the soil, add organic matter to it drawn from the air, and bring up mineral substances from the subsoil.

Straw. Seaweed: valuable composition of its ash; should be applied in compost, or plowed in fresh. Rape dust, how used.

Animal manures.

Flesh, blood, hair, horns, bones, etc. All quite rich, containing much nitrogen, and very valuable.

The animal contains no silica.

Bones are best applied in the form of dust, or dissolved by sulphuric acid.

Phosphates of the bones, are important to replace those carried away by the grain crops.

Animal manures (continued).

Manures of domestic animals.

Importance of preserving both the solid and the liquid parts of the manure; tanks are necessary, and all other precautions, to prevent drainage, exposure, and consequent loss of nitrogen.

Manure of birds richest of all, having the solid and the liquid parts together. Guano an instance of this class, very rich in nitrogen and in phosphates.

Fish, an important manure; contains much nitrogen, and decomposes easily. For this reason, it should be at once covered, or made into compost.

Saline and mineral manures.

Lime. Used as quicklime, slaked lime, and mild or air slaked lime.

Quicklime only to be used where there are no rich manures, as, when in contact with them, it liberates nitrogen, and thus deteriorates the manure.

The effect of lime in the soil, is to decompose organic and inorganic compounds, as well as to furnish food for plants.

Marls, a form of carbonate of lime; shell sand also another form; their beneficial effect as manures.

Saline and mineral manures (continued).

Gypsum, or plaster of paris, a compound of sulphuric acid and lime, valuable food for plants. Its good effects in attracting gases and moist-

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ure; abuse of it by adding, for a series of years, without other manure.

Common salt, nitrate of soda, nitrate of potash (saltpetre), carbonate of soda, etc., all powerful manures.

None of these, nor guano, should be in immediate contract with the seed, and are best applied in small quantities, with half the usual allowance of farmyard manure. A mixture of them, much better than one alone.

Wood ashes, coal ashes, peat ashes, are all good manures; ought to be kept from rain till they are used. Good to extirpate weeds, and to mix with other things for sowing.

Soot, a rich manure, contains much ammonia and inorganic substances.

Composition of various crops.

Wheat contains from 60 to 65 per ct. of starch, 12 to 20 per ct. of gluten, 3 to 5 per ct. of fatty matter. Oats, barley and rye do not differ greatly in composition.

Buckwheat less nutritious. Rice contains 80 per ct. of starch.

Indian corn has 60 per ct. of starch, oil about 10 per ct., protein substances 12 to 16 per cent.; is a very fattening food.

In peas and beans are starch about 40 per ct., protein 25 to 30 per ct., and a little oil.

Potatoes contain 75 per ct. of water, 14 to 20 per ct. of starch, and 1 to 2 per ct. of protein.

Turnips, beets, etc., have about 90 per ct. of water, and small quantities of protein, gum, sugar, &c. They make up for the poor quality, by the quantity of nutritive matter that they yield per acre, more than any other crops.

Application of crops in feeding.

Nitrogenous or protein bodies of the plant, are the same as those which form the muscle, and all the other parts of the animal that contain nitrogen.

The oily or fatty matters are also nearly identical in composition.

The inorganic substances are the same as in the plant, with the single exception of silica.

The plant is a species of manufactory, to supply food for the animal in the most convenient form.

Starch is in great part used up for the purposes of respiration: it is consumed by a species of combustion in the lungs and blood, to keep the animal warm. Fat, gum, and sugar, may also serve the same purpose, when necessary.

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The young animal should have food containing substances to increase its bulk; should not be stinted.

All animals exposed to cold, use up a large portion of their food in keeping warm.

The full-grown working animal only needs enough food to keep all of its parts complete: does not increase its bulk; hence its manure is richer.

The fattening animal requires food of such a character as to lay fat and flesh on its frame; its manure is also valuable, in all cases it is better as the food is richer.

Various modes of feeding; advantage of cutting straw, stalks, etc.

Feeding (continued.)

The system of feeding green crops; its probable advantage.

Feeding under shelter; sheltered stock increase more with less food.

Influence of the state in which food is given. Cut, cooked, soured food; theories of their action.

Any form usually better, so long as the animal will eat it, that increases the ease of digestion.

Milk and dairy produce.

Composition of milk.

Butter is a species of fat, enclosed in globules; these rise to the surface of milk, and form cream.

Temperature at which churning is commenced, highly important; also the time occupied, a tolerably long time probably best.

Care to be taken in separating buttermilk; consequences if any remains; salt to be pure.

Ash from milk is particularly rich in phosphates.

Cheese, made from casein of milk, a nitrogenous body thrown down or curdled by acids.

Various qualities of cheese, due in a degree to the greater or less richness of the milk.

Care to be taken in expelling whey, and necessity of using pure salt.

Milk should be curdled at a certain temperature.

Influence which selling off butter and cheese must have on pastures, by carrying away phosphates, etc.

This shows why bones are so beneficial an application to pastures.

I have but a few words to add in conclusion; these relate to the beautiful and distinct connection which exists between each part of

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the outline now completed. We may follow any particular substance in its course from the inanimate soil to the living plant, from the plant to the living and conscious animal, and finally see it return to the soil once more. In all of its changes it remains the same in its nature, but is constantly presented to us in new forms.

The earth, the mother of all, from whose bosom all forms of life directly or indirectly spring, and also draw their nourishment during existence, is sure, sooner or later, to attract her children to her breast again. The same source from which they drew their life, receives them in death and decay.

We see then from these facts, that there is an endless chain of circulation, from the earth, up through the plant, to the animal, and then again back to the parent earth. By watching this chain, and the various transformations of matter during its course, we may hope to grow constantly wiser, in every department of agriculture. We discover that nothing is lost: if we burn a piece of wood, it disappears, but has merely been converted into carbonic acid and water, both of which are at once ready to enter into new combinations. The animal or the plant dies, and also after a time disappears; but in its decay, every particle furnishes food for a new series of living things. The farmer can annihilate nothing, he can only change the form of his materials: every study which will enable him to do this according to his wish, should be pursued eagerly and perseveringly.

The farmer must remember that all of the substances with which he has to do, all of the agents that are at his command, are connected in their composition and action with the fourteen elementary bodies, organic and inorganic, that have been described in this little work. If he preserves them, or if he adds them as manures in an improper form, his utmost exertions are of little avail; if in a proper form, his land becomes fertile, and his returns all that heart could wish. If one is absent, the others may all be useless; if one is present too largely, the same effect upon the action of the others may ensue. How immensely important then, and how directly practical is the knowledge of these elements, and of the immense variety of combinations in which they present themselves!

In this connection, I wish to add two chapters as an appendix, upon particular subjects, for which there has seemed before to be no appropriate place; and which I have therefore omitted till now, rather than interrupt the continuity of the preceding essay.

The first of these subjects is that of chemical analysis. So many erroneous views are published, and otherwise disseminated, on this im-

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portant branch of study, that it seems necessary to present here some plain statements and facts, which may in a degree counteract the false impressions that have gone abroad. I shall endeavor to explain what a good analysis ought to be, and to give some simple methods for chemical examinations.

The second subject will be geology. This science has been alluded to in passing, and the nature of its connection with agriculture partially explained. I propose here to give more details, and also some illustrations as to the laws which are most important to the practical man.

OF CHEMICAL ANALYSIS.

THE TRUE NATURE OF CHEMICAL ANALYSIS.

Among all of the subjects that have been presented to the consideration of farmers, since the work of agricultural improvement commenced, none has been less understood, even by many of those who have pretended to be its expounders, than that of analytical chemistry, as applied to agriculture.

Many authors and speakers have labored to establish it as a fact, that there is no difficulty in chemical investigations, beyond what may be overcome by a few days of study: thus a large portion of the farming community have been led into the belief that when proper institutions are established, they themselves, or at least their children, may in a few weeks time do all of their own analytical work; just as they do their own plowing, and as well as the most accomplished chemist could do it.

That such ideas as these are totally at variance with the truth, none who have ever studied the subject thoroughly, can for a moment doubt. It is a perfectly safe conclusion when any man asserts, for instance, the entire simplicity and ease of analysing a soil, that his analyses would not be of a very accurate description.

Chemistry is a science that must be studied earnestly and perseveringly, just like any other branch of knowledge which has a wide range. In order to know what is in a soil, and to determine what are the quantities of its constituents, an intimate acquaintance is necessary, not only with the substances themselves in their almost endless relations and changes; but with great numbers of other substances from which they must be distinguished, and with which they are likely to be confounded by an inexperienced person.

We can only determine quantities by means of certain chemical processes; most of these depend on the addition of other bodies, to a so-

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lution in which are dissolved those that we wish to separate. Suppose now these bodies which are thus added, to be impure; obviously, the whole result will be erroneous; the chemist, then, must know how to distinguish with certainty, between pure and impure substances, and to tell what the impurities are.

When he knows all of these things, there are still a great number of minor but very important points, that require attention. He must use absolutely pure water, must filter his liquids through paper that has very little ash, and must weigh everything upon a balance that is sensitive to at least the tenth of a grain.

I might go on and mention other requisites to a good analysis, but those already noted are sufficient to show, that great care, skill and experience, are absolutely essential in this business; that uninstructed persons must constantly be making mistakes of the most flagrant description. The worst difficulty of all is, that in many cases, not having even knowledge enough to know when they have gone astray, they actually rely upon their own work as trustworthy, and lead others to do so too.

Results produced by such proficients are unhappily too common, and are always productive of harm wherever they go. The farmer who knows little or nothing of even chemical names, perhaps is not competent to judge of a good analysis; he cannot tell the difference between a pretender to scientific knowledge, and one who really knows something that is true and valuable. He takes these erroneous analyses as his guides, and probably falls at once into some serious mistake, by attempting to alter the supposed constitution of his soil. After he has been disappointed in this way a few times, he is very apt to condemn all scientific agriculture as ridiculous, and of no avail for any practical purposes.

What I wish to impress in this connection, is the necessity of caution in coming to such a decision. Let it first be considered, if the experiments to be carried out have been properly and carefully made, so that there could be no mistake in that direction. Let it next be ascertained that no physical obstacles are in the way of success, and if it is found beyond doubt that there has been no error from either of these causes, then let the farmer conclude, not that chemistry and scientific investigation are useless; but that the results of analysis obtained were wrongly interpreted, or that the examinations were incorrectly made.

There is truth in science, but it is not every one who can draw it out; and the proper course in cases of an unsatisfactory nature, is to distrust the *man*, and not the general principles.

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It is easy to show that there are very serious difficulties, other than those which have been already mentioned, in the way of making perfect analyses. We will take soils as an instance. Where mention has been made of the inorganic substances in soils, as in Table I, p. 640, it must have been noticed that the proportions of some of them were quite small, so much so, as to seem of little importance. It was, however, explained that the presence of these minute quantities was absolutely necessary, so much so, that our cultivated crops would not thrive without them.

Half a pound of phosphoric acid in 100 lbs. of earth, is a very unusually large proportion, even in our most fertile soils. Half a pound in 100, makes but a small figure when we come to give the composition of a single pound; it is only five-thousandths, $\frac{5}{1000}$, of a pound. Now 1 lb. is a far larger quantity of material than can be used with safety for an accurate analysis. The instruments employed, and the various methods of operation adopted, are such as, in nearly all cases, to forbid the use of a large bulk or weight of the substance to be examined. Consequently only a small fraction of a pound is worked upon, and from this all of the bodies present are to be separated, even down to a small part of a single grain.

It becomes at once obvious, that very great care, very good apparatus and no small portion of skill, are requisite to an analytical chemist in the determination of these minute quantities. If any of the chemicals used in the analyses are impure, the impurities of course have an influence upon the result: hence the chemist must know the properties of many other bodies beside those upon which he is at work, in order to be sure that he is not adding something which will prove injurious to the accuracy of his results.

There is still another, among many points that might be noticed in this connection. The processes necessary for the determination of potash, soda, and phosphoric acid, when all are present and in combination with other bodies, are in the last degree complicated and difficult. Many ways of determining them are described in books; some of these are altogether faulty, and all require much skill and knowledge on the part of the operator, that he may avoid serious errors. These bodies, it will be remembered, are among the most important that soils contain, because they are most likely to be exhausted by cropping. A comparatively inexperienced or uninstructed person, may determine iron, alumina, or silica, those bodies which make up the bulk of soils; but when they come to the most important part, the detection and separation of these small quantities, they probably either fail to find them at all, find them when they are not there, or find altogether too much.

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In view of the foregoing remarks, how inconsiderate, and how unwise are the statements of those who would lead the farming community to think that each man is in a short time to acquire the skill to determine all problems of a chemical nature, that may present themselves in the course of his experience. It is true that there is nothing mentioned above, which cannot be acquired by any intelligent man, but he can only accomplish it after a long course of study. When he has gone through with this course, still other difficulties present themselves; to make perfect analyses, he requires a laboratory, and rather expensive apparatus of various kinds.

A good analysis must have his undivided attention, and even then will occupy him not less than from ten days to a fortnight; and what is to become of his farm in the meantime? On the other hand, if he devotes himself actively to his practical pursuits, as every good farmer must, for at least a large part of the year, his chemical knowledge rusts, and he soon loses his facility, and aptitude for making reliable analyses.

The truth is, that the two pursuits are dissimilar: the chemist may and should know much of practical agriculture, but still his main business must be chemistry; the farmer may and should know much of science, but his daily occupation must be in the field. His leisure time may be most agreeably and profitably employed in gaining scientific knowledge, but the business of analysis, and accurate chemical investigations, must be left with those who are trained to it: all points which practice alone cannot explain, must go to them.

But some objectors continue, "It is an immense tax on the farmer that he must have every soil analysed, every manure thoroughly examined; these investigations are expensive, and are unattainable for this reason, by the great majority of the community." This is quite true, but it is no less true that the great majority will never require such minute analyses. If the soils in a particular district are all formed from the same rock, one or two careful analyses will suffice to determine the general character of the whole. So with manures; a few analyses of any particular kind will settle its value, in whatever part of the country it may be used. In cases where there is any thing particularly obscure or puzzling, in a soil or field, chemical analysis must be called upon to solve the question.

In most situations, as knowledge of these subjects increases, the intelligent farmer will daily become more and more qualified to experiment himself, for particular purposes, using manures of known composition: he may thus frequently arrive, unassisted, at just and important conclusions.

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There are, moreover, some points upon which the practical man may experiment without becoming a chemist, and without previous instruction. To a notice of the more important among these, I shall devote the remainder of this chapter.

AN ACCOUNT OF SOME SIMPLE CHEMICAL TESTS AND EXAMINATIONS.

The classifying of soils by means of mechanical processes, has already been explained, and it is only necessary here to recal attention to it. When an analysis of this kind is completed, the farmer has no light thrown from it upon the chemical composition of his soil, except so far as the silica and alumina, that is, the sand and clay, are separated, and their proportions known.

The following course may be adopted, in case more information is desired, regarding the especial constituents of a soil.

1. Take a weighed half pound or pound of the soil, and boil it in water for some hours: rain water is purest. Then pour it upon a filter of coarse porous paper, of the kind that druggists use for their filtrations. The mode of managing this operation may be seen in any druggist's shop. If the liquid does not come through clear at first, it must be refiltered till it is quite clear. The solution thus obtained is evaporated to dryness, and the solid residue burned. It will blacken at first, by the burning of its organic matter, but afterwards will become white again.

a. It may now be weighed on a small apothecaries' balance, and the weight gives the percentage of inorganic matter soluble in water, that exists in the soil.

b. This portion consists in many soils, for the most part, of sulphates or carbonates, of potash and soda. There is also commonly present some chloride of sodium, or common salt.

These are all valuable constituents of a soil; and hence, when an experiment of this kind shows such soluble matter to abound, it may be inferred that the soil is well supplied with an important portion of its requisite substances.

c. The part soluble in water is commonly not large: it amounts to not more than from one to three per cent, in many excellent soils.

2. Take another weighed portion of soil, or the same which has already been boiled in water, and heat it with some muriatic acid (hydrochloric acid,) diluted by two or three times its bulk of water. After standing a few hours, put this also upon a filter and wash the acid liquid through.

a. Wash the residue upon the filter with successive portions of clear water, until it no longer tastes acid; it may then be burned until all of

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the organic part is consumed, and weighed when it is cool. This weight gives the per centage of insoluble silicious matter in the soil.

b. To the filtered acid solution, is first added ammonia (common aqua ammonia), till it is no longer acid but alkaline; a flocculent precipitate then immediately falls, being iron and alumina. If it is of a deep red color, then iron predominates, and the contrary if it is nearly white. If the precipitate has a whitish green color, and reddens when exposed to the air, then the soil contains the protoxide of iron, in place of the peroxide. The first, it will be remembered, was spoken of on p. 642, as injurious to plants. It is for this reason important to know which oxide is present.

If it is shown by the above test to be the protoxide, the solution must be boiled again with an addition of a little nitric acid: this will convert all of the iron into peroxide, and it will thus remain upon the filter; the protoxide would have been partially washed through. Another filtering is now necessary. This should be done as soon as the precipitate has settled, and while the liquid is warm, so that it may filter more rapidly. The whole operation should be done in the shortest practicable time, and the liquid covered as far as possible from access of air.

From the apparent quantity of the iron and alumina, as weighed after burning, may be judged with tolerable accuracy the proportion present in the soil.

c. If the soil contained much lime, an effervescence would have been seen at first, when the acid was added: this is supposing the lime to be contained as carbonate, or in combination with carbonic acid, that being the most common form. If it is not present as carbonate, or if this is in so small quantity as not to show any action with acid, there are still means for its easy and certain detection. To the solution previously rendered alkaline by ammonia, and already filtered to separate iron and alumina, is to be added a little common oxalic acid. If there be even the smallest weighable quantity of lime present, a white powdery precipitate will begin to fall; from the abundance of this, may be estimated roughly the proportion of lime in the soil.

All of the above important points, it will be noticed, may be determined without any necessity for expensive materials or apparatus, by a person of ordinary intelligence. Easy as these things seem, however, in the description; so many difficulties will be found in practice, as will give the operator some conception of the care and study involved in a complete and detailed analysis; one where it is intended to ensure the greatest possible degree of accuracy.

I have not mentioned any tests for the presence of phosphoric acid,

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and other of the less abundant substances; because their detection and separation is so difficult, that the inexperienced beginner would only run into every description of error while looking for them.

It is not a hard matter for the farmer to arrive at the probable value of a marl, with quite a tolerable degree of accuracy. A weighed portion must be taken, and diluted muriatic acid added from time to time, until all effervescence has ceased. The mixture is then boiled, or at least well heated, and thrown upon a filter. The insoluble residue which remains upon the filter, must be washed clean from acid, dried, and weighed: this is chiefly silica. Its weight, subtracted from the original weight taken, will, in most cases, give nearly the amount of carbonate of lime that has been dissolved out by the acid. Small quantities of other substances have been dissolved at the same time, which have been mentioned in a previous chapter, as important to the value of the marl; but they are only to be separated by an instructed chemist.

Since expensive manures, such as guano, have come into vogue, the temptation to adulterations on the part of dealers is great, and farmers should be cautious in their purchases. By two or three simple tests, the comparative value of a substance offered as a guano, may be ascertained. Table VI., p. 670, will be a useful one for reference in such a case.

1. A weighed portion may be heated for some hours, at a temperature not exceeding that of boiling water. The loss of weight will then indicate the amount of water which the guano contained, and it can be referred with much probability to one of the classes mentioned in Table VI.

2. This dried portion may be burned, till it has ceased to lose weight: the loss is organic matter, and salts of ammonia; if it is greater than the largest quantity mentioned in Table VI., then it is probable that an adulteration has been practised, by mixing some finely-ground organic substance, such as tan-bark.

3. The residue after burning should be nearly white, not more than about 36 per cent of the whole weight, and should dissolve almost entirely in muriatic acid. If a large portion refuses to dissolve, some solid substance may have been added as an adulteration.

4. Some solid may also have been added, which would dissolve in acid; and it therefore becomes necessary to ascertain if that which has dissolved be really phosphate of lime. This is simply and easily done by adding ammonia, till the acid solution has become alkaline: if phosphate of lime be present, it will immediately be precipitated in the form of white flocculent masses, the abundance of which may indicate the proportion present in the guano.

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5. It is safe still farther to test the organic matter, by mixing with quicklime, as described, page 670. A very strong odor of ammonia should become perceptible immediately, and continue to be given off for a considerable length of time.

The foregoing instances are of a nature so simple as to be easily understood, and are sufficient to show that the farmer, without becoming a chemist, may still make some valuable experiments for his own satisfaction; and this with such means as are to be found in any country village.

I might multiply cases of the same nature to an indefinite extent, but as this is not an extended treatise upon analytical chemistry, the above illustrations are sufficient for the present purpose.

One great end will be attained by all who go through with such examinations as these, or who experiment upon the various substances mentioned in the previous portions of this essay. They will soon familiarize themselves to such an extent with chemical phenomena, and terms, that they will be able, far more readily and perfectly than ever before, to comprehend the writings and discoveries of scientific men, and to draw from them truths profitably applicable to their own pursuits.

THE GENERAL APPLICATIONS OF GEOLOGY TO AGRICULTURE.

OF THE STRATIFIED AND UNSTRATIFIED ROCKS.

Geological science explores the structure of this earth's surface, to as great a depth as our means of observation extend. In the course of geological investigations, various important and interesting laws have been established.

It is found that the earth has been, before man inhabited it, a scene of constant change and convulsion. Forces from within and without, have elevated, upheaved, and even overturned, some portions of its surface; while others have been overwhelmed, or depressed, in a corresponding degree. Dry land has thus appeared where seas had flowed, and seas have swept over what had long been elevated above their surface. But it may be asked, how do we know all of these facts? The answer to this is plain, simply by investigation of existing rocks, in the phenomena connected with their position and structure.

The labors of geologists, have resulted in the establishment of certain great divisions, among the rocks which present themselves for our inspection. The leading, and grand division, is into stratified, and unstratified rocks.

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The unstratified rocks, are also often called primary rocks, because they occur below the others. These rocks are the granites, syenites, traps, etc. They have no arrangement into regular strata, but are confused crystallized masses, evidently the result of fusion; they have all at one time been melted like lavas, and are, in fact, ancient lavas, which in cooling, have assumed their present form. Occasionally these old lavas have burst up through the stratified rocks, just as volcanic eruptions do now, and have cooled in the open air: in such places we have the ranges of granites, and traps, or basalts, which cover so much of the earth's surface.

The stratified rocks may be divided into secondary, and tertiary formations, according to their age. The primary rocks, as has been stated, bear marks of fusion, and of having been formed by heat; not so with the secondary, and tertiary rocks. Their materials have evidently all been deposited by water, having in many cases undergone striking changes afterward, but always retaining marks of their origin. Sometimes the strata are thick, as in some sandstones, and limestones; sometimes thin, like the leaves of a book, as in some slates.

a. An example of stratification may be seen in almost any sand or clay bank, where the successive deposits by water are clearly marked; some of the layers being quite thick, others very thin; some quite level, and others again very undulating.

These strata were of course all deposited in regular succession, one above another: if there had been no subsequent changes, then we should only be acquainted with a few of the upper deposits. But the various convulsions of which I have spoken, interfered to prevent this order; we consequently find the strata lying in all imaginable positions, sometimes flat, sometimes bent, sometimes inclined, and sometimes straight on end or vertical. In this way they are all, even to the lowest, in one place and another, presented to our view. Whatever convulsions they may have undergone, however they have been twisted and contorted, their relative position to each other is *always the same, in whatever part of the world they may be found.*

This is a most important practical fact; as an instance, there are many kinds of sandstone: *under* one kind coal is always found, and this is called the new red sandstone; but *below* the coal is another, called the old red sandstone. Where this last occurs, it is a positive certainty that no coal exists beneath it, and consequently explorations are fruitless. A person unacquainted with geology, would as soon look under one sandstone formation as another, and would therefore be liable to severe losses. Such losses used frequently to occur, before geology had arrived at its present advanced state.

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It is necessary to say in a few words, how these various stratifications are distinguished from one another, and how their relative age can be known with so much certainty.

The different geological examinations of which I have spoken, show that there were not only vast alterations on this earth's surface, before man became its inhabitant; but that race upon race, millions upon millions, of animated creatures, had lived and died here. With the successive changes which have deposited the various rocks, whole classes of animals and plants have been swept from existence, and replaced by others, differing perhaps entirely in form and structure. But these races, though they disappeared, were not annihilated: they were embalmed, as it were, where they died; and we can now dig out from the bowels of the rock, an impression, or the frame itself, of a fish, as clear and distinct as when it first died; or a plant, with every little feathery leaf preserved, as perfect as when it waved on that unknown land, or floated in that ancient sea, long centuries before man drew the breath of life.

These are the records which enable us to read the early history of our globe; these mute witnesses, each in its own peculiar rock, identify that rock, in whatever part of the world it may occur. There is a gradual progression in their appearance. The lowest fossiliferous rocks contain but few remains, and those of species entirely dissimilar to any which now exist. As we come down from this most remote antiquity, the fossils increase in number, and also in their likeness to the forms of living species; until at last, in the very latest formations, we find both animals and plants, nearly or quite identical, with some of our existing kinds. A skilful geologist can always tell, from its fossils, at what position in the series any rock belongs.

The number of stratified rocks is very great, but it is not my present purpose even to name them; I shall only show, how a knowledge of their composition bears upon the practical cultivation of the soil.

OF THE DIFFERENCES IN COMPOSITION AMONG THE VARIOUS ROCKS.

All of our rocks, both stratified and unstratified, differ in composition most materially. We may take first, two examples of the primary, or unstratified class, *granite*, and *basalt*, or *trap*.

Granite is a mixture of three minerals, called quartz, feldspar, and mica. The quartz is nothing but silica, in the feldspar and mica, there is also silica, with much alumina, and very considerable quantities of potash and soda. There is scarcely any lime, and no phosphates, beyond perhaps mere traces. Some varieties of granite do contain

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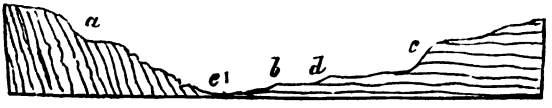
these substances in fair proportions, but for the most part there is very little of either. Hence granitic soils are frequently cold and poor, particularly on the sides of the hills. In the valleys they are apt to be better, as the best part of the decomposing minerals naturally washes down the slopes. The abundance of alumina, however, often makes these soils quite stiff.

The true trap rocks, or basaltic rocks, also contain feldspar, but with it an abundance of another mineral called hornblende; or another still, called augite. Both of these abound in lime, and consequently in this class of rocks, according to theory, we have the materials for producing soils superior to those formed on the granitic regions. Practice supports the same view; the greenstone traps and basalts, almost invariably form strong, good soils, fitted for the successful cultivation of almost any crop. Some of the richest land in Scotland is on this formation.

The trap rocks vary in different situations, as to their proportion of lime. In nine samples examined by Prof. Johnston, the per centage of lime ranged from 2 to more than 10 per cent. These soils are so rich in some places, that the surface is carted away to spread upon poorer fields.

The same differences of composition occur among the stratified rocks. Some form very excellent soils, and others very barren ones. The annexed diagram will show how the soils alter, from what is called the cropping out of mineral strata.

Fig. 11.



At *a*, the strata are set up vertically, and are quite thin; suppose them to differ considerably in composition, there would be a different soil in every mile or less. I once examined a series of seven slate rocks, taken from as many different layers of slate, in the same district. Four of them were almost destitute of lime, two had about 2 per cent. each, and one had nearly 8 per cent. How different must have been the soils which these slates formed!

As we descend upon the plain, in the diagram, the strata lie nearly horizontal, and each may perhaps cover a large district. Thus beginning at *b*, we perhaps come upon a poor sandy soil, formed from some inferior sandstone; proceeding along this for fifty miles, we come at *d*, upon a limestone of good quality; here the character of the soil changes at once, and we have a rich, fertile district.

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At the points where two different strata meet, is very likely to be a good soil; because a union of the two generally supplies either all that is necessary to the chemical composition, or alters for the better the physical character of the soil.

Suppose *e*, in the hollow, to be an exceedingly wet and tough clay, too tenacious for profitable cultivation: at the point *b*, where we meet the poor sandy soil before mentioned, the sand mixes with the clay, and forms a mellow rich soil. At *c*, on the hill side, where the strata lie horizontally, changes are of course more frequent, and the character of the soils at the base is apt to be affected by washing down from those above.

These differences in the character of different strata, explain also some facts relative to the wetness of soils. We often see the side of a steep hill very wet. If the stratum of rock and soil at *c* be stiff, and impervious to water, all the rain which falls on the country back and higher up will sink till it comes to this stratum. It cannot penetrate and sink farther, so it follows along this layer, till it comes out above *c*, on the side of the hill, and wets all of the country below. On the other hill *a*, if the strata are pervious to water, it will all sink away, and the soil will be perfectly dry.

OF THE CAUSES WHICH HAVE DISTURBED THE REGULAR FORMATION OF SOILS FROM THEIR UNDERLYING ROCKS.

From the foregoing explanations, it might be supposed, that if we know the rock lying underneath any given field, and can tell of what that rock is composed, we may be able to decide positively upon the character of the soil on the surface. This is not, however, always the case.

That it is not so, may be ascribed to the numerous convulsions of the earth's surface, which have been before mentioned. Geological explorations have shown, that immense districts in various parts of the world, have no relations in the character of their surface, to the geological features of the region; the rocks which would ordinarily show themselves upon the surface, are covered, to a greater or less extent, by transported materials from some other source. Such observations as these, have led to the study of what are called the phenomena of *drift*.

The vast quantities of transported materials, which thus overlie original rocks, consist, on inspection, of the ruins of other formations that have been broken and crumbled down, and their fragments borne to other regions by some unknown power. It is clear, however, that water has been one chief agent in this action; for in nearly every case

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the stones which occur in drift, are water-worn and rounded; thus showing that they have been rolled along in some mighty current, till all their angles have worn away. We see hard quartz rocks, weighing many tons, that have been perfectly rounded and smoothed in this way, and can thence conjecture how fearful must have been the rush and the war of elements, that produced such effects.

Geologists consider that there have been several periods of drift, on the northern part of this continent; all of them being in a westerly direction, coming from the east. Some ascribe it to the action of ice, either in the form of glaciers, or icebergs; others to the upheaval of the bottom in some portion of the north sea, sending an indescribable torrent of mingled mud, ice, and water, sweeping over the face of the country; tearing away hills, scooping out valleys, crumbling away various strata of rock, and depositing their materials in different and often far distant localities.

The fact that the rocks on the sides of some of our highest hills, are ground smooth, and marked with scratches and even deep grooves, in the direction which these currents, or masses of ice, took, shows how irresistible must have been their force, and how great their volume.

In some cases, the action of this drift has been, to cover up good soils, or rocks that are capable of producing such soils, with immense accumulations of sand and gravel. In other places it has deposited a better class of substances than the original. On the whole, it may be considered that it has done good, by mixing the ruins of various formations; varying the soil, and the consequent productions, over districts that would otherwise have been uniform; and where the want of these various materials might have been severely felt, in all the ordinary occupations of life. What must have seemed at the time, wild chaotic confusion and ruin, was then after all, a wise provision of God, to prepare this continent more perfectly for our habitation.

There are other sections, where foreign accumulations cover the original soil, and alter its capabilities, from causes than we can more fully comprehend; causes which are operating at the present day. These are alluvial plains, formed by substances deposited during the annual overflow of rivers. These, during high water, become charged in the rapid currents of their sources, with materials from all of the formations through which their course lies. When the water reaches the plains of the low countries, where it has room to expand beyond its usual limits; a deposit of these suspended substances takes place, as soon as the current is checked by spreading out over the surface, and its flow becomes tranquil.

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Thus an annual layer is formed, which in time makes a soil of great depth, and usually of great fertility; for the reason that it is a mixture from the ruins of many rocks, and therefore likely to contain all that plants need. We have many instances of such soils in this country; on the banks of the Connecticut, of the Mohawk, of the Mississippi, and a hundred other streams.

These causes then, are sufficient reasons for saying that we cannot always assert what any particular soil will be, if we know the rock of the district in which it is situated. Our opinion upon such a subject must be given with the reservation—"If there have been no disturbing influences." An inspection of a district by a practised eye, would immediately detect any foreign deposits, and determine their character.

It is easy to perceive how a knowledge of this subject, even of a superficial nature, must be valuable to a practical man. If his soil is formed by the decomposition of a granite rock, he can ascertain with little trouble, what are the constituents of that rock, and what are the special manures most likely to prove beneficial in his section. So also if he wishes to buy land in a distant region, and has no definite knowledge as to its character; he may determine its probable quality at once, from a good geological map. If he has cultivated the soil of some particular formation, till he has come to like it, and to know better how to cultivate it than any other; he may in the same manner learn where to find for himself, or for his children, the same kind of land in some other district.

I may observe in conclusion, that while Geology is thus practically useful, it also is among the most interesting of sciences; for it takes us back through ages that are past, and lays open the early history of our globe, with its silent yet speaking records of extinct races, and of sudden, overwhelming changes.

Nothing in this world can give such an idea of antiquity, as one of these fossils that I have mentioned; the remains of a fish, or a shell, from some of the lower stratified rocks. We are accustomed to think of the pyramids as ancient; but this creature enjoyed life, and fulfilled its part in the animated world, at a period which brings the pyramids, in comparison, down to things of yesterday. Since it died, race after race, in gradual progression, has occupied the seas and the land; has in its turn been sooner or later swept away, to make a part of some new formation. Wide seas or rapid torrents have rolled over its resting place; and then again by a new change, it has supported the immense growth of some old fossil forest on dry land, which, in its turn overwhelmed, gave place to other seas, containing still other forms of life.

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After all these unnumbered centuries of revolution, it comes forth to the gaze of man upon the earth, which in its day and generation it helped to prepare for his abode; to speak to him of the infinite power of that Being who made them both.

It is thus with everything in this world of ours: on every side we are reminded of a superior, and an All-wise Creator. We have been tracing nothing but the evidences of his wisdom and power, in the simple, yet beautiful laws which regulate the being and growth of all living things; and here we have in this bit of stone, an evidence strong as doubt itself could demand, that these same laws were in operation thousands of years before any of our race existed.

To study such laws, then, is a noble, as well as attractive pursuit, for they are not to outlast us, as they will everything in the material world around us, whose existence and whose periodical changes they regulate.

Our bodies, it is true, will come under the universal power of death; will be resolved once more into their various elements; will perform once more their part in that great circle of life, which we have endeavored to follow in its varied round; but our souls will be beyond all such influences; will, living, be acting out an immortal destiny, in a world where every transformation will not be a step toward ultimate decay, and where the blossoms of this brief lifetime will ripen into the sweet or bitter fruits of eternity.

CULTIVATION OF POTATOES AT MOUNT AIRY COLLEGE, PENN.

(Extract from Report of JOHN WILKINSON, Principal.

We have had a favorable season for our crops generally; though potatoes diminished at least 50 per cent. by the bug (see article annexed, on the curculio) in the tops, which were killed before the crop was half matured. I noticed, when harvesting, that there was occasionally a hill, the tops of which were still green; and on examination found these were all of a variety produced on the place, which we call "purple seedlings," which were accidentally mixed with the Mercers, (our principal crop,) and found that they yielded at least one-fourth more than the Mercers, and did not appear to be affected by the curculio, and were large and fine, and perfectly sound. But on examining the tops, it was found that the insects were as abundant in these as in the Mercers; but, owing to their being so much larger than those of the Mercers, there was abundant room and nutriment in the center of the plant for the insect, without destroying or interfering with the circulatory portions of it. These have been preserved for seed.

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For potatoes, we use long yard manure, spread on the surface just immediately before planting, which is raked into every other furrow in which the seed is placed, under the manure, and on the furrow side of the furrow, or under the edge of the furrow slice, and before they are plowed in; the manure over the potatoes is strewed with the pine coal and ashes obtained from the locomotive, burning pine wood. In case of an insufficiency of yard manure, we use guano, about 300 lbs. per acre, which we prepare thus: Screen the guano to separate the lumps, which are pulverized on the barn floor by means of the flail; then mix with fine coal, ashes and gypsum,—two parts guano, one of gypsum, and seven of coal; strew it on the seed in the furrow.

We experimented in planting one portion of our potatoes by strewing the seed in the furrow, with very light wheaten bran, about 100 bushels per acre, and the product was fully equal to any other portion of the field. We use potatoes, for seed, of medium size, cutting so as to insure two eyes to each piece, and place them eight inches apart in depth, and ten in width. When we have completed the planting, we roll thoroughly. About ten days after the planting, we cultivate the whole surface with the cultivator, and continue to use the harrow in the dry part of the day, nearly every day, until about half of them are up. If managed thus, they need but little more cultivation; the passage of the cultivator through them once will be sufficient. We raise them by plowing the same way that we plowed when planting, except that we turn the back into the dead furrows, running the cultivator, drawn by one horse, in the furrow from which the potatoes have been picked, which will uncover what the plow has not. After this process the ground is harrowed, cross-plowed, and the potatoes again picked, when it is sown with 300 lbs. of guano, (prepared as above described,) the wheat sown, and both cultivated in together.

TENTH FAMILY.

CETONIDAE.

(By Miss MARGARETTA H. MORRIS, Mount Airy, Germantown, Penn.)

The curculio trinotatus of Melsheimer—Baridius, Say—Baridius restitus, Schönher, deposits its egg on the leaf buds of the potato vine, from eight to eighteen inches above the ground. The eggs, when first deposited, are bright red, but soon change to a pale yellow; they are deposited singly upon the bud, at the foot-stalk of the leaf, and never more than three on a stem. The young grub, which is of a pale yellow color, soon penetrates the bud, and enters the stem of the plant, where, with its head downwards, it feeds on the interior of the stem, and proceeds towards the root, where it frequently undergoes its change. When there are three in one stem, the whole interior of the stem, from the spot where the worms entered to the end of the root, will be found hollow. Here the insects undergo their entire change, and may be found in various states of progress, according to the season in which they are searched for; the perfect insect seldom leaving the stem until the plant is quite dead, from which I infer that the potato plant is the food of the perfect insect, as well as of the grub. The potato plants seldom show signs of injury until the grubs have arrived at maturity, unless the weather be hot and dry; then they soon wither, and the plants look as if they had been scalded.

January 20th, 1850.

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ANALYSIS OF THE APPLE.

(By J. H. Salisbury, M. D.)

This examination was entered into with the view of throwing some light upon the composition of the apple. To determine whether or not, it contained a sufficient percentage of nutritious matter to render it profitable as food for stock. That it has been used with a good degree of success, in many instances, for several years, is well known; but it is by no means generally acceded, that the apple is as nutritious as it actually is. Those who have had some experience in feeding good varieties, will find in the following analysis the reason of their favorable opinion of this valuable product of the farmer;—valuable, because if properly managed, the crop is sure, large, rich, and attended with less labor and expense than almost any other.

It was the intention to have analyzed several varieties of sweet apples, but owing to the lateness of the season before the examination was commenced, and the scarcity of these varieties, I was unable to obtain any, except the Tolman Sweeting.

PERCENTAGE OF WATER, DRY MATTER AND ASH, IN THE

	Pulp of the Swaar.	Skin or epidermis of the Swaar.
Percentage of water,.....	84.75	61.20
" dry matter,.....	15.25	38.80
" ash, ...	0.26	0.72
" ash calc. on the dry matter,..	1.705	1.856

PERCENTAGE OF WATER AND DRY MATTER IN THE

	Tolman Sweeting.	Roxbury Russet.	Kilham Hill.	English Russet.	R. Island Greening.
Percentage of water, ...	81.52	81.35	86.31	79.21	82.85
" dry matter,	18.48	18.65	13.69	20.79	17.15

The above results were obtained the first of March. The percentage of water in the six varieties examined ranges from 79.21 to 86.31 per cent. The Kilham Hill contains most, the Swaar stands next, the Greening third, and the English Russet has the least. The percentage mean from the six results is 82.664.

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The percentage of inorganic matter in the apple is small, not much exceeding that of the richer grains. Like the ash of wheat and corn, it is obtained free from coal with some difficulty, on account of its fusing at a low red heat.

COMPOSITION OF THE ASH OF THE

	Swaar.		*Kilham Hill.*	
	With carbonic acid.	Without carbonic acid.	With carbonic acid.	Without carbonic acid.
Carbonic acid, ...	17.62	.....	16.17	.....
Silica,.....	1.43	1.750	1.34	1.693
Phosphate of iron,....	1.82	2.227	1.52	1.838
Phosphoric acid,.....	11.51	14.083	11.51	13.922
Lime,.....	4.05	4.956	2.46	2.98
Magnesia,.....	1.46	1.786	1.14	1.379
Potash, ...	34.34	42.016	29.62	35.821
Soda,.....	15.77	19.296	21.40	25.879
Chlorine,.....	1.72	2.098	1.93	2.333
Sulphuric acid,.....	5.44	6.656	6.50	7.860
Organic matter thrown down by nitrate of sil.	4.20	5.139	5.20	6.290
	99.35	100.000	98.84	100.000

COMPOSITION OF THE ASH OF THE

	Roxbury Russet,		*English Russet.*		*R. I. Greening.*	
	With carbonic acid.	Without carbonic acid.	With carbonic acid.	Without carbonic acid.	With carbonic acid.	Without carbonic acid.
Carbonic acid,....	14.11	.....	10.12	.....	13.69	.....
Silica, ...	1.95	2.273	0.94	1.061	1.15	1.333
Phosphate of iron,	1.34	1.564	0.96	1.092	1.04	1.213
Phosphoric acid,..	13.81	15.057	9.94	11.110	9.49	11.054
Lime, ...	4.16	4.857	2.92	3.263	3.60	4.231
Magnesia, ...	1.63	1.903	0.97	1.068	1.80	2.211
Potash,.....	29.51	34.358	34.27	38.323	31.31	38.440
Soda, ...	21.13	25.173	27.20	30.408	18.55	22.761
Chlorine, ...	1.97	2.300	1.65	1.848	1.85	2.272
Sulphuric acid, ...	5.84	6.889	5.98	6.684	6.53	8.019
Organic matter thrown down by nitrate of silver,	4.30	5.021	4.64	5.187	6.11	7.503
	99.75	100.000	99.59	100.000	99.46	100.000

The analyses are inserted both with and without the carbonic acid. They were calculated without it in order to show the real composition of the inorganic matter of the fruit. The carbonic acid is formed during the combustion of the organic matter, and hence cannot be regarded as a constituent part of the apple, except in very minute quantity.

In silica, the apple is by no means rich, containing in the varieties examined from about one to 2.3 per cent. The mean percentage of the five results is 1.637. The phosphate of iron ranges from about one to 2.2 per cent.; the phosphoric acid from 11 to 15 per cent.; the lime

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from about 3 to 5 per cent.; the magnesia from about one to 2.2 per cent.; the potash from about 35 to 42 per cent.; the soda from 19.3 per cent. to 30.4 per cent.; the chlorine from 1.85 to 2.33 per cent., and the sulphuric acid from 6.66 to 8.02 per cent.

The percentage of ash in the apple is small, yet rich in phosphoric and sulphuric acids, potash and soda. 100 lbs. of apple ashes, deprived of carbonic acid, contain, according to the mean of the foregoing results, about 13 lbs. of phosphoric acid, 7 lbs. of sulphuric acid, 38 lbs. of potash, and 25 lbs. of soda. In other words, these four bodies make up about 83 per cent. of the whole ash.

1000 lbs. of fresh apple contain about 827 lbs. of water, 170.4 lbs. of organic matter, destroyed by heat, and 2.6 lbs. of inorganic matter, or ash. 1000 lbs. of dry apple contain between 17 and 18 lbs. of ash.

MEAN OF THE FIVE FOREGOING ANALYSES.

	With carbonic acid.	Without carbonic acid.
Carbonic acid,	15.210	.....
Silica,	1.362	1.637
Phosphate of iron,	1.336	1.593
Phosphoric acid,	11.252	13.257
Lime,	3.442	4.199
Magnesia,	1.400	1.669
Potash,	31.810	37.610
Soda,	20.810	24.799
Chlorine,	1.822	2.169
Sulphuric acid,	6.062	7.229
Organic matter thrown down by nitrate of silver,	4.890	5.828
	99.396	100.000

PROXIMATE ORGANIC ANALYSIS OF THE

	Tolman Sweeting.		*Sugar.*		*Kilham Hill.*	
	1000 parts fresh apple.	1000 parts dry apple.	1000 parts fresh apple.	1000 parts dry apple.	1000 parts fresh apple.	1000 parts dry apple.
Cellular fibre,	33.90	190.620	18.80	126.685	29.90	229.453
Glutinous matter with a little fat and wax,	3.52	19.793	1.18	7.276	1.73	13.276
Dextrine,	28.96	162.890	28.54	192.352	21.72	166.681
Sugar and extract,	99.05	557.178	81.04	546.618	59.30	455.069
Malic acid,	2.50	14.061	3.82	25.737	3.46	26.552
Albumen,	8.97	50.452	13.08	88.125	13.17	101.066
Casein,	0.89	5.006	1.96	13.205	1.03	7.904
Dry matter,	177.79	1000.000	148.42	1000.000	130.31	1000.000
Water,	815.20	.....	847.50	.....	863.13	.....
Loss,	7.01	.....	4.08	.....	6.56	.....
	1000.00	.....	1000.00	.....	1000.000	.....

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PROXIMATE ORGANIC ANALYSIS OF THE

	Roxbury Russet.		*English Russet.*		*R. I. Greening.*	
	1000 parts fresh apple.	1000 parts dry apple.	1000 parts fresh apple.	1000 parts dry apple.	1000 parts fresh apple.	1000 parts dry apple.
Cellular fibre,.....	31.20	173.623	44.78	220.929	33.58	204.000
Glutinous matter with a little wax and fat, ...	1.70	9.460	2.22	10.952	1.32	8.019
Dextrine, ...	36.22	201.558	41.11	202.823	32.07	194.888
Sugar and extract,.....	90.27	502.337	93.46	461.099	76.37	464.061
Malic acid,.....	3.23	17.975	2.98	14.702	3.04	18.486
Albumen, ...	15.03	83.639	16.13	79.579	16.37	99.459
Casein,.....	2.05	11.408	2.01	9.916	1.89	12.088
Dry matter,.....	179.70	1000.000	202.69	1000.000	164.64	1000.000
Water,.....	813.45	.....	792.11	.....	828.46	.....
Loss, ...	6.85	.....	5.20	.....	6.90	.....
	1000.000	.....	1000.000	.....	1000.000	.....

Besides the above mentioned bodies, the apple contains a small quantity of tannic and gallic acids. Of the varieties examined, they were found in larger proportion in the russets than in either of the others. To these acids this fruit owes that peculiar astringency so strikingly developed in some varieties, and easily detected in all, by the taste and by the black color struck through them when cut with a knife, or any instrument made of iron.

Leibig states that starch is found in the unripe apple. I have not been able to detect it in the ripe fruit, except in the Talman Sweet, which gave a very faint blue with iodine.

A small quantity of white wax is found, which is derived mainly from the epidermis, over which it is spread, imparting to it, in many varieties, a smooth greasy feel. A little fatty matter is also present, together with a respectable percentage of gluten. The glutinous matter differs from that of the grains, in being less adhesive when moist, and more granular when dry.

The foregoing analyses were made during the months of March and April. The Tolman Sweeting was somewhat shriveled, and rather past its season; the other varieties were fresh and in good eating order. The Tolman Sweeting, English Russet, and Kilham Hill were furnished by E. P. Prentice, Esq., of Mt. Hope.

MEAN OF THE SIX FOREGOING ANALYSES.

	1000 parts of fresh apple.	1000 parts of dry apple.
Cellular fibre,.....	32.03	190.879
Glutinous matter with a little fat and wax,.....	1.94	11.463
Dextrine,.....	31.44	186.805
Sugar and extract, ...	83.25	497.627
Malic acid,.....	3.17	19.585
Albumen,.....	13.79	83.720

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Casein,	1.64	9.921
Dry matter,	167.26	1000.000
Water,	826.64	.....
Loss,	6.10	.....
	1000.000	.....

The ripe apple is rich in sugar and a body analogous to gum, called *dextrine*, which has the same composition as starch, but differs from it in being soluble in cold water, and not colored blue with iodine. It derives its name from the action of its solution on polarized light, it causing the plane of polarization to deviate to the right; hence its name—*dextrine.*

Dextrine and gum should not be confounded with each other. They differ very materially in many respects. The former possesses the property of being converted into grape sugar by sulphuric acid and by diastaste, while the latter does not. Dextrine belongs to the class of bodies which are susceptible of nourishing the animal body. All the starch taken as food is converted into dextrine before it is assimilated by the system. The acids of the stomach possess the property of converting starch into this body.

In the fresh apple, 100 lbs. contain about 3.2 lbs. of fibre; 0.2 of a lb. of gluten, fat and wax; 3.1 lbs. of dextrine; 8.3 lbs. of sugar and extract; 0.3 of a lb. of malic acid; 1.4 lbs. of albumen; 0.16 of a lb. of casein, and 82.66 lbs. of water.

In the dry apple, 100 lbs. contain about 19 lbs. of fibre; 1.1 lbs. of gluten, fat and wax; 18.7 lbs. of dextrine; 49.8 lbs. of sugar and extract; 2 lbs. of malic acid; 8.4 lbs. of albumen, and 1 lb. of casein.

In the fresh potato, 100 lbs. contain about 9.7 lbs. of starch; 5.8 lbs. of fibre; 0.2 of a lb. of gluten; 0.08 of a lb. of fatty matter; ¼ of a lb. of albumen; 0.45 of a lb. of casein; 1.27 lbs. of dextrine; 2.64 lbs. of sugar and extract, and 79.7 lbs. of water. In the dry potato, 100 lbs. contain about 48.5 lbs. of starch; 29 lbs. of fibre; 1 lb. of gluten; 0.4 of a lb. of fatty matter; 1.25 lbs. of albumen; 2.25 lbs. of casein; 6.32 lbs. of dextrine; and 13.2 lbs. of sugar and extract.

By comparing the composition of the apple with that of the potato, it will be noticed: First. That the former contains, according to the above analyses, about three per cent more of water than the latter. Second. That dextrine and sugar in the apple take the place of starch, dextrine and sugar in the potato. Of the former, 100 lbs. of good fruit contain of dextrine, sugar and extract 11.4 lbs.; the latter has in the same amount of fresh tubers, 13.61 lbs. of starch, dextrine, sugar and extract. In the dry fruit 100 lbs. contain of dextrine, sugar and extract, 68.5 lbs.; in the same quantity of dry potato there is of starch,

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dextrine, sugar and extract, 68.02 bs. The above proximate principles are the main bodies in the apple and potato which go to form fat. In the aggregate amount then of fat producing products it will be seen that the apple and potato do not materially differ. It would be natural, however, to infer that 50 lbs. of dextrine and sugar would, if taken into the system, be more likely to make a greater quantity of fat in a given time, or at least to make the same amount in a shorter period, than an equal weight of starch, for this reason, that the two former bodies, although nearly the same in composition with the latter, yet are physically farther advanced in organization, and hence probably approximate nearer the constitution of fat. If this view be taken, then the apple, if of good quality, may be regarded equally if not more rich in fat producing products than the potato. Thirdly, that the apple is richer in nitrogen compounds than the potato. 100 lbs. of fresh apple contain of albumen 1.38 lbs.; the same amount of fresh potatoe has ¼ of a lb. 100 lbs. of dry apple contain 8.37 lbs. of albumen and an equal weight of dry tubers has 1¼ lbs. 100 lbs. of fresh fruit contain of casein 0.16 of a lb., and an equal weight of fresh tubers, 0.45 of a lb. 100 lbs. of dry apples have 1 lb. of casein, and the same amount of dry potato contains 2¼ lbs. Hence it will be observed that 100 lbs. of fresh apple contain of albumen and casein 1.54 lbs., and the same quantity of fresh potato 0.7 of a lb. 100 lbs. of dry fruit have of albumen and casein 9.37 lbs.. and an equal amount of dry tubers, 3.50 lbs.

From the above it will readily be seen that in albumen the apple is richer than the potato, while in casein the reverse is the case. That the aggregate amount of albumen, casein and gluten in good varieties of the apple is more than double that of the same bodies in the potato; hence the former may be regarded richer than the latter in those bodies which strictly go to nourish the system, or in other words, to form muscle, brain, nerve, and in short assist in building up and sustaining the organic part of all the tissues of the animal body.

The juice of the apple forms what was regarded not long ago, a favorite and almost necessary appendage to the farmer's stock of winter luxuries. It is now, however, looked upon by him with comparative indifference as a beverage, he having found a far better and more profitable use for his apples, that of converting them into fat instead of alcohol. The juice of the apple after being fermented is called cider, and contains much of the nutritive matter of the fruit. Cider contains alcohol, sugar, gum or dextrine, malic acid and the phosphates and sulphates of the alkalies, with a little tannic and gallic acids. The juice before being fermented has in addition to the above ingredients, albumen and casein.

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APPENDIX.

For the purpose of comparing the composition of the apple with that of several other kinds of fruit it may not be uninteresting to introduce their proximate organic analyses here in connection with those of the apple. M. Berard has examined the unripe and ripe cherry, the unripe and ripe peach, the ripe pear, and the unripe and ripe gooseberry, and arrived at the following results:

	Peach.		*Pear.*		*Cherry.*		*Gooseberry.*	
	Unripe.	Ripe.	Ripe and fresh.	Kept for some time.	Unripe.	Ripe.	Unripe.	Ripe.
Chlorophyl and coloring matter,	0.04	1.10	0.08	0.01	0.05	.....	0.03	.....
Sugar,	trace.	16.48	6.45	11.52	1.12	18.12	0.52	6.24
Dextrine,	4.10	5.12	3.17	2.07	6.01	3.23	1.36	0.78
Fibre,	3.61	1.86	3.80	2.19	2.44	1.12	6.45	8.01
Albumen,	0.76	0.17	0.08	0.21	0.21	0.57	1.07	0.86
Malic acid,	2.70	1.80	0.11	0.08	1.75	2.01	1.80	2.41
Citric acid,	.....	.....	.....	.....	.....	.....	0.12	0.31
Lime,	trace.	trace.	0.03	0.04	0.14	0.01	0.24	0.29
Water,	89.39	74.87	86.28	83.88	88.28	74.85	88.41	81.10
	100.00	100.40	100.00	99.65	99.00	90.60	100.00	100.00

The grape has not been subjected to a rigid chemical examination. Scheele and Braconnot found in it but one acid, tartaric. M. Berard found in addition to tartaric, malic acid. Besides these two acids he found an odoriferous substance, sugar, gum or dextrine and albumen.

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EXAMINATION OF RHUBARB.

(By J. H. SALISBURY, M. D.)

General remarks.—Of rhubarb, the following are the principal species and varieties in cultivation. The Rheum rhaponticum (common pie plant), a native of Asia, introduced in 1575; R. undulatum, a native of China, introduced into Europe in 1734; Elford rhubarb, or scarlet variety; R. hybridum, a native of Asia, cultivated in 1778; Giant rhubarb, a variety of the rhaponticum; R. palmatum, or Turkey rhubarb; R. compactum and R. australe.

Besides the above, there are several varieties cultivated in this country, principally derived from the rhaponticum. The first five kinds are cultivated entirely for their petioles. Several attempts have been made in the western part of Europe, and in this country, to cultivate the root of the first and last three mentioned sorts, for medicinal purposes; but without any great degree of success. I do not see, however—if the composition of the root and rest of the plant were well known, together with its habits, mode of culture, time of gathering, &c.—why success might not attend its cultivation in the United States, as well as in China and Turkey. The root of good Turkey rhubarb commands now in market from three to four dollars the pound. If it could be successfully cultivated here, it would constitute one of our most valuable and lucrative articles of trade.

Uses.—The large succulent petioles are highly esteemed for making tarts, pies, jelly, preserves, wine, &c., which resemble much those made of apples and gooseberries. The root of several species is highly esteemed in medicine, as a cathartic, possessing mild tonic and astringent properties. Among the species used in medicine, are the R. rhaponticum, R. palmatum, R. compactum, and R. australe. The R. rhaponticum, and several varieties derived from it, are mostly cultivated in this country for their very fine flavored petioles. The root grown in the western part of Europe and the United States is less firm, and acquires much less medicinal value than the root of the same species grown in China, Turkey and Russia. The reason of this difference is not well known, but is probably owing to soil, climate, time of gathering and mode of culture.

Composition of the several parts of the plant.—In this country, the several species of rhubarb are cultivated mostly for the petioles, or leaf

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stalks. The texture and flavor of these vary greatly with the soil, mode of culture and climate. We should naturally infer that the soil in which rhubarb thrives (from its size and rapid growth) must be richly supplied with those materials in a soluble form which are found in the various organs and tissues of the plant. It is necessary to know then, the composition of the plant before we can positively decide what kind of soil is best fitted to its growth. The following analyses were made with a view of throwing some light upon this subject.

The Giant rhubarb, a very fine variety of the rhaponticum, cut June 1st. Plant in flower. Stout growth. The roots were very compact, and remarkably large. Furnished by Mr. C. N. Bement, of Albany.

PERCENTAGE OF WATER, DRY MATTER AND ASH, IN THE SEVERAL PARTS OF THE PLANT.

	Root.	Stalk.	Petioles.	Leaf blades.	Flowers & pedicels.
Percentage of water, ...	82.000	89.50	93.465	88.00	86.90
" dry matter, ...	18.000	10.50	6.535	12.00	13.10
" ash, ...	0.925	1.13	0.940	1.53	1.32
" ash calc. on dry mat.	5.194	10.762	14.384	12.75	10.076

The percentage of water in all parts of the plant is large, amounting to from 82 to 93 per cent. The dry matter of the several parts is richly supplied with ash. The petioles contain the greatest proportion, and the root the least.

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INORGANIC ANALYSES OF THE SEVERAL PARTS OF THE PLANT.

	Root.		*Stalk.*		*Petioles or leaf stalk.*		*Leaf blades.*		*Flowers and pedicels.*	
	With carbonic acid.	Witho't carbonic acid.	With carbonic acid.	Witho't carbonic acid.	With carbonic acid.	Witho't carbonic acid.	With carbonic acid.	Witho't carbonic acid.	With carbonic acid.	Witho't carbonic acid.
Carbonic acid,	12.050	.....	9.400	.....	9.430	.....	14.900	.....	6.050	.....
Silicic acid,	3.950	4.595	0.450	0.511	1.400	1.557	7.600	8.928	5.609	6.147
Phosphates,	30.050	34.788	17.200	19.528	22.200	24.702	19.400	22.792	27.500	29.786
Lime,	4.785	5.414	3.574	4.056	2.476	2.754	5.740	6.744	1.464	1.607
Magnesia,	2.920	3.375	0.200	0.227	0.204	0.227	1.160	1.363	0.102	0.112
Potash,	7.217	8.349	8.096	9.189	5.287	5.883	7.870	9.247	9.185	10.812
Soda,	24.736	28.607	33.261	38.750	33.260	37.015	27.360	32.143	24.471	26.561
Sodium,	0.144	0.166	0.973	0.111	1.651	1.837	2.110	2.479	2.110	2.316
Chlorine,	0.222	0.255	1.480	1.679	2.516	2.799	3.210	3.772	3.210	3.524
Sulphuric acid.	5.155	5.957	10.723	12.171	5.274	5.868	4.270	5.017	10.860	11.891
Organic mat'r thrown down by nitr'e of sil.*	7.350	8.494	12.150	13.778	15.600	17.358	6.400	7.515	6.600	7.244
	98.579	100.	97.507	100.	99.298	100.	100.020	100.	97.152	100.

*In the essay on the analysis of Indian corn will be found the method followed in obtaining the organic matter from the ashes of plants. This organic matter in the paper referred too, is set down as organic acids. This was done from the fact that it seems to be combined with the inorganic bases of the ashes after the manner of acids. It does not discolor the ashes in the least, and is so firmly united with them that it is quite impossible to expel it entirely unless they (the ashes) are kept for some time at a temperature above their point of fusion.

As there has been some objection raised to the name used in the paper referred to above, we will—till it has undergone a more thorough examination—call it organic matter thrown down by nitrate of silver. It may not be improper to state here that some chemists have doubted the presence of this matter in the ashes of plants. We do not blame them—for several reasons—for doing so; but would kindly ask them, before they make their opinions more public (for their own sakes as well as ours) to give the subject at least—a cursory examination. We seek only for truth; and when it is clearly shown that there is no organic matter in the ashes of plants, which can be determined by the method described in the aforesaid paper, then we will be most willing to acknowledge frankly that we have heedlessly fallen into the ditch of error, our friends kindly endeavoring to keep us out notwithstanding.

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The analyses have been calculated without the carbonic acid, (this is not a constituent of the plant, but is formed during the combustion,) to show the real composition of the inorganic matter which actually exists in the plant, and is necessary to its constitution. The stalk and petioles contain but a small percentage of silicic acid, while the leaves, flowers, pedicels and root contain a respectable quantity. All portions of the plant are rich in phosphates, ranging from 19 to 34 per cent. in the several parts. The root contains the most, the flowers and pedicels stand next in order, the petioles next, the leaves fourth, and the stalk contains the least. The lime ranges, in the several parts, from 1½ to 6.7 per cent.; the magnesia from one-tenth of one per cent. to 3.3 per cent.; the potash from 5.8 to 10.8 per cent.; the soda from 26.5 to 38.75 per cent.; and the sulphuric acid from 5 to 12 per cent.

The analyses show that the ash of this plant is in a great measure made up of the phosphates and sulphates of the alkalies. These making up from 69 to 79 per cent of the entire inorganic matter of the plant.

It will be seen from the above that a soil well suited to nourish and sustain vigorously the rhubarb plant, must be peculiarly rich in the phosphates and sulphates of the alkalies. Bone dust, plaster, salt and ashes afford the inorganic bodies required by this plant. Besides these, decomposing animal and vegetable manures are also needed to warm and loosen the soil and facilitate the decomposition and consequently the solubility of the inorganic materials.

Proximate organic analysis of the petioles.—Petioles, or leaf stalks taken from the plant the first of September: very large and succulent; 1¼ inches in diameter and 2¼ feet long. A variety of the Rhaponticum. Furnished by Mr. J. Rathbone, of Kenwood.

PERCENTAGE OF WATER, DRY MATTER AND ASH.

Percentage of water,	87.77
" dry matter,	12.23
" ash,	2.27
" ash, calc. on the dry matter,	18.56

PROXIMATE ORGANIC ANALYSIS.

	With the water.	Without the water.
Fibre, with a little starch and chlorophyl,	1.265	9.894
Malic acid and extract, with a little tartaric & oxalic acids,	5.710	44.622
Dextrine,	0.550	4.302
Fibre,	3.235	25.303
Matter separated from fibre by a weak solution of potash, gives the characteristic color of albumen with sulphuric acid,	1.605	12.554
Albumen,	0.270	2.112
Casein,	0.150	1.173
Water,	87.770	.....
	100.555	100.

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The above specimen is larger and firmer than the one examined the first of June and contains less water and a greater percentage of inorganic matter. The leaves contain a little oxalic and malic acids. The oxalic acid is probably in the form of binoxalate of potash and soda. The petioles or leaf stalks have a mild, pleasant acid taste. They contain a large quantity of malic acid with considerable oxalic and a little tartaric acid. These acids are most likely in the form of acid salts of the alkalies.

The well known and highly valued medicine called *rhubarb* is the root of several species of Rheum. It has been analysed by Schrarder, Brande, Hornemann, M. Ossian Henry, Schlossberger and Dopping. (*Pereira's Materia Medica, Liebig's Annalen, Thompson's Vegetable Chemistry, U. S. Dispensatory, &c.*)

It contains *Rhein.* (Syn. Rhabarbaric acid, Rhubarb Yellow, Rheumin.) This is a yellow granular crystalline body, somewhat analogous to chrysophanic acid. It is extracted nearly pure from the root by hot sulphuric ether. On carefully evaporating the solution it is obtained in small crystals which are quite tasteless and insoluble in cold water. It imparts to concentrated sulphuric acid a beautiful carmine color; to solutions of ammonia and potash, a fine red, and to soda and lime, a light red hue. It is soluble in ether, alcohol and acetic acid, to all of which it imparts a deep yellow color; it is less soluble in cold nitric acid, and but slightly soluble in hydrochloric and oxalic acids, all of which it colors yellow. On boiling these latter acids, more is taken up, but is again precipitated on cooling. It is thrown down from an alkaline solution by sulphuric acid in the form of a deep yellow powder, which is nearly or quite insoluble in water. It is precipitated by the acetate of lead on standing for some time. The neutral salt throws it down in the form of light yellow flocs, leaving a clear solution slightly tinged with yellow. The basic salt throws it down in the form of a red floculent precipitate leaving a slightly turbid light red solution.

Aporetin.—A resinous body of a black color, brittle, decomposed at a temperature below its point of fusion.

Erythroretin. $C_{19} H_9 O_7$. A light yellow crystalline, resinous body, soluble in ether and alcohol and volatilized partially by heat without decomposition. It affords a dull red solution with concentrated sulphuric acid, from which it is thrown down in the form of a floculent precipitate by water.

Phæorctin. $C_{16} H_8 O_9$. A yellowish brown powder quite insoluble in ether and water, but readily soluble in alcohol. With the alkalies it forms a deep red solution from which it is precipitated by the mineral acids.

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Rhaponticin. A yellow, tasteless, crystalizable body, insoluble in ether, but soluble in a large excess of dilute alcohol. Besides the above the root also contains chrysophanic acid, a trace of oil or fatty matter, starch, gum, mucilage, sugar, woody fibre, pectin, tannic, gallic, oxalic, sulphuric and phosphoric acids, together with chlorine, lime, magnesia, silica, iron, potash and soda.

POULTRY.

As there is much inquiry at the present time in regard to the best varieties of the Domestic Fowl, we give an extract from an article from the Agricultural and Industrial Journal of the Royal Agricultural Improvement Society of Ireland, kindly furnished us by their Secretary E. Bullen, Esq. of Dublin. It is from Mr. H. D. Richardson, author of the "Domestic Fowl" a work most valuable to all who are engaged in the raising of poultry.

ON THE BREEDS OF POULTRY BEST SUITED TO THE FARM.

(By H. D. Richardson.)

Unreflecting persons may regard Poultry as too insignificant a branch of farming-stock to deserve attention in this age of agricultural improvement. That the contrary is the case, however, will be at once seen when I state, that the value of the fowl, of various kinds, exported from Ireland in 1846–7 amounted to upwards of HALF A MILLION OF MONEY. I could adduce further proof of the importance of this description of live stock.

It is not my intention to discuss the question of the origin of the many varieties of domestic fowl with which we are now acquainted, it being my business merely to describe such as are likely to produce the largest and most certain profit to their breeder. I may premise by stating that the common dunghill fowl is just as much out of place in the farm yard as the cur dog would be in the kennel of the sportsman, and I truly hope that the time will soon arrive when its place will be occupied by birds really calculated to prove profitable. The most important varieties of fowl are the *Cochin China*, the *Malay*, the *Spanish*, the *Dorking*, the *Old Sussex*, the *Hamburg*, the *Polish*, the *Columbian* or *Mongolian*, the *Bantam*, and the *Game Fowl.*

The *Cochin China* is usually of a bright bay color, darker above, with a black mark, of a horse-shoe shape, upon the breast; wings borne tightly up, bearing erect and lively; whole form approaching to that of the Bustard; comb and wattles large and simple. This fowl was introduced into Great Britain, some few years back, by her Majesty, and from its great

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beauty and remarkably striking appearance, rapidly acquired general notice and admiration: it is truly a royal bird. The hen is also prolific to an extraordinary degree; "Bessy," a hen in possession of the Queen, is stated to have layed an egg daily for 95 successive days—a degree of fecundity unrivalled by any other known variety. These hens, also, repeatedly lay two, and even three, eggs per day for many days in succession: this I have personally experienced. I am not prepared to speak practically as to the flesh of this beautiful bird, it being as yet somewhat too scarce and costly to admit of an ordinary person placing it upon his table. I, however, have been informed that it has been frequently used by the royal family, and found to be excellent. The cock is *game* to the last degree, capable of killing the most powerful game cock in a few moments.

The *Malay* is characterized by great size, nearly equal, indeed, *to that* of the Cochin China. This size, however, consists rather in limb than in body; and, as it thus produces a quantity of *offal*, rather than available flesh, it is not to be regarded as a good bird. The hen does not lay so large an egg as her size would promise. Although comparatively valueless in a pure state, the Malay fowl is, however, as will presently be shown, valuable for the purpose of crossing with other varieties.

The *Spanish*, known by its jet black colour, large *toothed* comb and wattles, and white cheek or earpiece. This is one of the very best birds with which I am acquainted; it is fully climatized, and consequently hardy; is of beautiful appearance; possesses flesh of the best and whitest quality, and *acquires it with rapidity*, which is a most important consideration to the producer; and the hen lays a large egg, and is only surpassed in fecundity by the Cochin China.

The *Dorking*, so called from a town in Surrey, where it was originally bred, is remarkable for possessing five well developed toes, and sometimes a rudimentary sixth on each foot. This is a plump-bodied, white-fleshed fowl, very good for table use; the hen is tolerably prolific, but is not equal in that respect to the Spanish. The *Sussex* has latterly, to a great degree, superseded the Dorking in popular estimation; in form and appearance, indeed, the birds are identical, save in colour, the Dorking being, when pure, usually of a speckled or *cuckoo* color, and the Sussex being usually dark brown, sometimes relieved with white spangles, but not invariably so. *White Dorkings* are prized by some, but they are delicate and do not attain any size; they are therefore, not worth the farmer's attention. The Sussex possesses an additional superiority over the Dorking in being only furnished with the usual complement of toes. I have repeatedly met with instances of Dorking cocks breaking, or

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otherwise injuring, their extra toe, becoming lame and gouty in consequence, and even eventually perishing; and other fanciers have confirmed my experience from the results of their own. The Sussex is free from this defect, and, being in all other respects equal to the Dorking, is fully entitled to be regarded as a better bird.

The *Hamburg* and *Polish* may be briefly dismissed. They resemble each other closely; are characterized by their large top-knots, and gay, nay even gorgeous, plumage. They are very ornamental, but not entitled to the notice of such as look chiefly or solely to pounds, shillings, and pence.

The *Columbian* or *Mongolian*, a native of South America, and now to be found in most of the long colonized portions of the northern division of that vast continent, is a tall and singularly beautiful bird, standing very erect, possessing a carriage at once spirited and majestic; in this respect, as well as in general form, closely resembling the Cochin China fowl, and betraying marks, like that fowl, of being only half reclaimed. The color of the Columbian fowl is a black ground, relieved about the head, neck, and wing coverts, by numerous spangles of white, and here and there patches of brilliant green bronze, possessing a strong metallic lustre. The comb of the cock is large, and the hen has one also, as large as that of many ordinary cocks; she is also furnished with a tuft of feathers below the bill, and two tufts springing, mustache like, from the corners of the mouth. I am disposed to regard this bird as the primitive stock whence the fowl now known as Spanish has been originally derived; the Spanish, however, is a great improvement upon it, as far as *utility* is concerned. The Columbian fowl were first brought under my notice by Doctor Bull, of Cork, who also kindly presented me with two magnificent pair of the birds. The egg layed by the hen is of extraordinary size, but she seldom lays more frequently than every second day, and, during a considerable portion of the laying season, does not lay at all. Nor is this extraordinary bulk of egg to be regarded as an unqualified advantage, for I have met with instances where it has proved *too large for expulsion*. In one instance, the hen having carried her egg upwards of eight days, and betraying symptoms of rapid sinking, I killed her. On opening her I found three eggs of prodigious size, the most mature being little inferior to that of a goose, and lying crosswise. On another occasion, of a similar nature, I tried the popular remedy of inserting a small pinch of common salt in the vent; the result was, almost immediate expulsion of the egg, but the hen did not lay any more during that season. I applied to Dr. Bull for his advice as to what should be done under such circumstances, and he recommended the dilatation

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of the parts by means of a common lithotomy forceps, and the forcible abstraction of the egg. However simple the remedy in such cases may be, I do not think that fowl subject to such accidents are to be recommended to those who look to profit. I may add, that such of these fowl as I have killed were also characterized by *black* and *tough flesh*. Such has been my experience, and such the experience of every person of my acquaintance who has kept these fowl, except Doctor Bull, who, I am inclined to think, must be in possession of a superior breed, or must be acquainted with some peculiarity relative to their feeding or management unkown to others. As a *fancy fowl* I know of none, however, to compete with this, except the magnificent Cochin China.

The *Bantam* is too well known to require description. The bay variety, with black spangles and naked legs, known as "the Sebright," is the most valuable. At the show in London, February, 1847, three of these birds fetched the amazingly large price of fifty pounds and one shilling. The Bantam is singularly prolific, and the little egg is considered a delicacy peculiarly suited to the invalid, or to persons whose digestive powers have become impaired.

The *Game Fowl* are very prolific, are ready fatteners, and possess more delicate flesh than any other known variety. If they can be kept strictly apart, well and good, otherwise their pugnacity renders them unfit inmates of the general poultry yard, as their individual value will by no means compensate their keepers for the injury they may do to other, and, probably, more valuable birds. There are some *crosses* which I am inclined to believe, more valuable, in a mere pecuniary sense, to the farmer than any of our pure varieties; otherwise, of course, as a mere matter of taste, the pure and unmixed breeds are unquestionably to be preferred.

Her Majesty's poultry-keeper, Mr. Walters, was, I believe the first who tried the experiment of crossing the Dorking with the Cochin China fowl. As a matter of course, the progeny was a noble and valuable breed, but was in most cases disfigured by the *fifth* toe. To obviate this, I would recommend the old Sussex breed to be substituted for the Dorking in the experiment. Mr. Burgess, of Pill-lane, Dublin, has the merit of having established an entirely new and valuable variety, known as "Burgess' blacks," by a cross between Spanish and Malay, grafted with Dorking. The Sussex or Dorking makes a good cross with the Spanish. The Columbian and Sussex produce an admirable bird, possessing excellent shapes, great fecundity, and retaining the characteristic of laying eggs nearly as large as those of a goose.

My own advice to the farmer on the subject of crossing, is, that he keep, as a standing stock, Spanish and Sussex—that he also have, if possible, a Cochin China cock, but in any case a Malay cock. In this manner he will, by cautious intermixture, gradually arrive at his desideratum. The Sussex possesses the highest perfection of form; the Spaniard the best flesh, and laying qualities of a high character; while the Malay gives increased size, and, if it be the Cochin China which is employed for that purpose, also increased fecundity.

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A HISTORICAL, TOPOGRAPHICAL & AGRICULTURAL SURVEY OF THE COUNTY OF WASHINGTON.

Taken under the direction of the New-York State Agricultural Society,
BY ASA FITCH, M. D.

[The first portion of this work, on being put into type, has been found to occupy so much more space than the writer had supposed it would do that he has been led to depart from his original design of pursuing the several topics in consecutive order, that he might first complete those branches to which this Survey mainly has reference. As the several topics to be reported upon are measurably distinct and independent of each other, the succession in which they are presented becomes a matter of minor consequence. To fully report upon every subject is obviously impracticable. It has therefore been deemed especially important that in those industrial branches to which attention is most prominently directed in this county, and in which it occupies a leading rank, a full account should be rendered; whilst in those branches in which other counties of the State are in advance of this, a cursory notice only, from this county, will be required. And overburdened with matter as the present volume of Transactions is, the following articles only are now submitted; the sections being numbered onwards from last year's volume, for the purpose of more convenient reference in a final index.]

PART SECOND.

SHEEP HUSBANDRY OF WASHINGTON COUNTY.

106. *Adaptedness of this county to fine wooled sheep.*—No section of our country can be better adapted for the convenient and profitable keeping of fine wooled sheep than the eastern half of Washington county. From the Bald mountain range of hills on the west to the state line on the east, almost every farm contains a portion of interval or permanent meadow from which hay for winter consumption is gathered; and the remainder consists of hilly upland, yielding a short, sweet nutritious grass for summer pasturage. To the west of this tract, the level lands towards the Hudson river furnish no such pasturage; and to the east of it, in Vermont, the lands become more broken and mountainous, with no intervening valleys supplying the requisite amount of meadow lands.

Most of our hills it is true are susceptible of cultivation to their summits, and at the present period, would be more profitable if given up to tillage. But although the prices of wool render its production little lucrative, it can here be grown to such advantage, that these hills now are covered with flocks, and it is probable they will so continue in all coming time.

107. *Wool statistics of this and other counties.*—Eminently adapted as this county is for the keeping of sheep and the growth of wool, this has been during the past twenty years the leading and prominent business of the county. And the quantity and quality of this staple here produced, is probably unrivalled in any other section of our land.

Of thirty-six million pounds of wool grown in the United States, according to the returns of the last national census, 9,845,295 were produced in the state of New-York, and next to us stands Vermont, yielding 3,699,235 pounds.

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The state census of 1845 furnishes us with the following statistics of the sheep husbandry in the five counties of this state that rank highest in this branch, and also in the counties of Dutchess, Rensselaer and Columbia, whose local situation, and whose reputation in the wool market associates them with Washington county. In addition to the returns given by the census, a column is appended, showing the average weight of the fleeces in each county, this being a pretty accurate indication of the fineness of the wool; and also a column showing the average number of sheep to every hundred acres of cleared land in the county.

COUNTIES.	No. of sheep over one year old.	No. of lambs.	No. of fleeces.	Pounds of wool.	Av'ge wt. of fleeces. lbs.	oz.	Sheep to 100 acres.
Washington,...	199,311	66,746	202,848	579,056	2	14	64
Madison,.....	190,043	78,278	187,840	571,274	3	1	71
Ontario,.....	187,608	70,326	193,557	630,739	3	4	61
Otsego,.....	182,122	75,542	187,782	548,868	2	15	46
Chautauque,....	163,495	69,220	160,256	485,826	3	¼	64
Dutchess,.....	139,797	61,693	147,928	471,096	3	3	37
Rensselaer,....	118,884	45,608	122,021	375,902	3	1	42
Columbia,.....	109,906	52,660	117,580	352,739	3	0	32
State of N. York,	4,505,369	1,870,728	4,607,012	13,864,828	3	0	38

108. *Relative fineness of the wool.*—It appears from these statistics that the reputation which this county has so long enjoyed in the wool market, justly belongs to it. In the fineness of its wool it surpasses all the other large wool-growing counties of the state. And one county only, produces a greater amount of wool than Washington, namely, Ontario; and the wool of that county is evidently of a coarser quality than that which is here grown, as is clearly indicated by the fact that the fleeces there are on an average six ounces heavier than they are with us.

These returns make the average weight of the fleeces of this county to be two pounds and fourteen ounces. But this, it is quite probable, is somewhat heavier than they actually are. Almost every man is prone to over-estimate the amount of his clip, and is annually disappointed when it comes to be weighed, to find the fleeces so light as the scales declare them to be. Those who have been extensively engaged in purchasing the wool of this county for several years, and have thus become familiar with its weight, think that two pounds and three quarters is about as high as the fleeces will average.

109. *Discrepancy between the number of sheep and of fleeces.*—There is quite a discrepancy in the census returns above cited, between the number of sheep reported and the number of fleeces. Thus, in this county, thirty-five hundred more fleeces are reported, than the number of sheep which we had; and a similar excess is shown in several of the other counties. This I suppose has been caused by the unsold clip

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of the preceding year having been reckoned in, in certain towns, wherever it was found remaining on hand.

110. *Disproportionate number of sheep to the lambs in this county.* Another interesting fact is shown in the preceding table. Whilst this county exceeds any other in the State in the number of its *sheep*, four other counties surpass us in the number of their lambs. At first glance there would appear to be some error in such returns. That we with some 36,000 more sheep than Chautauque county possesses, should not raise as many lambs by over 2,000 as that county does, will seem very singular to those not intimately conversant with this matter. There can be no material error in the return, upon this subject. The enumeration was made at midsummer, shortly after shearing time, when every farmer knew the exact number of his sheep and of his lambs. And the result is in no wise different from what persons intelligent with regard to our sheep husbandry were prepared to expect. Sheep in this county are reared for their *wool only;* and so long as they can furnish this, of a fair quality, so long are they retained among us. The owners of all our best flocks never sell a sheep to the butcher. It is only the aged and refuse individuals that are parted with. In the autumn of the year, it is customary to cull the flock, and such individuals as appear unable to survive the rigors of the coming winter are selected and disposed of to the pelt-mongers, for the value of their hides and tallow. Young and thrifty sheep, for the shambles, are never drawn from this county. Hence our flocks abound with a greater proportion of adult and aged sheep, than do those of other counties.

In addition to this, there are one or two other customs which make the number of our lambs less than it would otherwise be. When a flock is as numerous as the owner desires, he frequently ceases from raising lambs altogether, for one or more years, the additional quantity of wool hereby obtained from the ewes, being reckoned as more than equivalent to the value of their lambs, when the care required for rearing these is taken into the account. This is particularly the course adopted when no buck can readily be obtained whose stock will be an improvement to the flock. Moreover, many of our flock-masters adopt it as a rule, never to raise lambs from their yearling ewes, inasmuch as this practice has a tendency to injure their growth and render them permanently dwarfish in stature. These are the causes, there is little doubt, which render the number of lambs in this county so disproportionately small for the large number of sheep which we possess.

111. *Number of sheep in the several towns of the county.*—The following table shows the number of sheep in the several towns of the

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county at three different periods within the last quarter of a century. It is particularly interesting as exhibiting the steady advance in this important branch of our industrial pursuits that has been made in every section of the county, during that period.

TOWNS.	1825.	1835.	1845.
White Creek,	9,407	28,488	30,780
Salem,	10,599	21,848	25,422
Easton,	9,545	15,175	24,000
Hartford,	7,523	13,535	23,816
Hebron,	8,894	13,627	19,161
Jackson,	6,046	13,039	16,308
Cambridge,	5,907	12,724	15,983
Fort Ann,	8,630	12,860	15,941
Argyle,	8,378	10,696	13,988
Whitehall,	6,198	9,966	13,791
Kingsbury,	6,755	9,766	12,627
Greenwich,	6,835	10,036	12,410
Granville,	8,660	19,464	10,908
Hampton,	3,379	4,870	6,658
Fort Edward,	3,673	4,567	6,022
Putnam,	1,766	4,540	5,269
Dresden,	813	956	1,720
Total,	111,308	206,157	254,899

It will be perceived by a glance at the above table, that for twenty-five years past, every town in the county has been steadily advancing in this branch of business, with one notable exception. Granville, which in 1835 ranked as the third town in the county, in the number of her sheep, has exchanged that for the dairy business—and, as the market prices have ranged of late years, this change has been greatly to her advantage. Indeed, since the date of the last enumeration above recited, the price of wool has been so discouragingly low, that, at least in some years, the keeping of sheep has been an expense to the proprietor, instead of a profit. In consequence of this, several large flocks have been entirely broken up and sold out, and all the others have been more or less curtailed; and it is probable the census now being taken will show that the number of our sheep at this date is nearly or quite a fourth less than it was five years ago.

112. *Competition in wool from the west and south considered.*—The wool market has of late been so glutted with western wool, and the open winters of that region enable sheep to be carried through this portion of the year at an expense so far below what is practicable here, that many of our farmers have been filled with alarm, anticipating that we should be driven entirely out of this business. But the writer has never shared with his neighbors in these forebodings, even when they were much more

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rife than at present. The whole history of the sheep shows that it is only in hilly and mountainous districts that fine wool has been grown with success, and this quadruped would require to be changed to a different nature from what it has ever heretofore possessed, ere it can be maintained in perfection upon the level surface and rank herbage of the western prairies. And the brief experience which has already been had, abundantly confirms this opinion. So rapidly does the fleece degenerate, that our western neighbors find that to keep up the quality of their flocks, it is necessary for them to have a constant influx of fine-wooled bucks from the east; and among other testimony upon this point, that of senator Ewing is most decisive, who tells us that a portion of his flock having been sent from Washington county, Pennsylvania, to Illinois, deteriorated so rapidly, that three years afterwards he scarcely knew his own wool. Our settled conviction in this matter ever has been, that the rich, level lands of the west are adapted only to that class of sheep whose value rests in the carcase, rather than in the fleece, and that the Saxon and Merino breeds can never be successfully maintained there.

The south bids more fair to become our competitor in the article of fine wool than does the west. The elevated, dry pasturage furnished among the mountain lands in the western part of Carolina and in Virginia would seem well calculated for sustaining the fine-wooled breeds; and the mildness of the winters there, may enable wool to be grown at less cost than it can possibly be furnished by the farmers of the north. As respects climate, we stand in about the same relation to the south that Saxony does to Spain; and whatever superiority this may give the former country over the latter on the European continent, the same it may be expected we possess over our southern neighbors. If, as is the fact, the rays of the sun here are sufficiently powerful to inflame and excoriate the backs of the finest wooled lambs, it would seem impossible to rear such lambs at all many degrees farther to the south.

113. *Predilection of our inhabitants for fine-wooled sheep.*—The idea that the eastern, hilly part of this county is peculiarly adapted for the keeping of sheep of the highest grade of fineness—that in this respect it equals if it does not excel all other sections of our country—has long been entertained by our citizens. Hence a decided preference for and attachment to sheep of this kind has here prevailed, with a corresponding dislike towards those of an opposite character. So strong has been this predilection, that the late eccentric civilian of Roanoke, who is reported to have said that he would willingly go across the street at any time to kick a sheep, would here find any number of persons to go with him on

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such an errand, *provided* the sheep was a coarse-wooled one; and if it belonged to the opposite class, they would be equally inclined to accompany the gentlemen in his ambulation, to mete out to him the same treatment he bestowed upon their favorite. And this attachment has been firm and unwavering through all the encomiums that have of late years been lavished upon the long-wooled varieties. There has been no inclination here to change from our present stock; and although our county agricultural society has had both classes of sheep upon its premium list, two specimens only, of animals of the English blood, we believe, have ever been exhibited at our Fairs; and the premiums for mutton-sheep have therefore been year after year awarded to large bodied animals of the Merino blood, there being no others among us to compete with them. Indeed, so settled and decided are our citizens in the opinion that the Merinos and Saxons are the breeds for which this county is naturally adapted, that any one who might call in question the correctness of this opinion would be apt to receive a reply akin to that given by a Scottish Highlander, who, vexed with the innovations that some were attempting to make among the stock in his neighborhood, petulantly replied to a traveller who asked what breed of sheep they had in that district—"They are such as the Almighty placed here. When we get to be wiser than He is, we'll change 'em."

114. *This will continue to be a wool-growing district.*—This section of country, including this county and the adjoining parts of Vermont, is currently, and so far as we are able to determine, correctly, regarded as being by its climate, its inland location, and the inequalities of its surface, more closely assimilated to the kingdom of Saxony than is any other part of the American continent. Its character as a wool-growing district has been amply tested. And all things considered, it must be admitted that it has every prospect of remaining conspicuous as it now is for the number and fineness of its flocks. Naturally adapted as it is for the keeping of fine-wooled sheep, extensively introduced and acclimated among us, as this species of stock now is, and experienced in its management as our population has become, there is every probability that this will continue to be a wool-growing district, second to no other in our land.

But of this county it may confidently be affirmed, it will never be occupied exclusively in the production of wool. Agriculture will always form a large part of its business. Susceptible of easy cultivation as nearly all the lands of this county are, the relative prices of grain and of wool, will at most times, it is probable, pay better for the production of the former than of the latter. It may hence be expected that so much of his land as the farmer can till within himself, that is, with his

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own personal labor and that of his household, will always be under cultivation; and at the same time, a flock of sheep, requiring as it does, but little time and attention during the busy period of the year, will occupy that portion of the farm which is least convenient for tillage, and thus add an important item to the proprietor's income. This is their great recommendation. Without increasing in any sensible degree its expenses, and without interfering with and hindering its other operations, a limited number of sheep can be supported, mainly upon such portions of the farm as would otherwise be neglected and for the time valueless. And this has saved our flocks from extermination during the low prices of wool for the past few years. Having withstood this disastrous period so well, it may confidently be expected that no depression in the wool market can ever occur which will have the effect of expelling them from this district. When the price of wool is low, their numbers will be diminished and more ground devoted to agricultural operations; and whenever the production of wool is *per se* profitable, their numbers will be increased, and then also, lands valuable for cultivation will be appropriated to their maintenance. Thus, wool will always be grown here in large quantities, but its amount will be augmented or diminished according to the condition and prospects of the market.

Immediately to the east of us, the condition of things is different. Here is a large tract of hilly and mountainous land, little of which is capable of being profitably cultivated, but which is admirably adapted for the pasturage of sheep. These will here be kept in large numbers, irrespective of the fluctuations of the wool market—it being the only thing to which these extensive mountain ranges can be advantageously devoted. And the flocks there summered, will be brought down for their winter keeping, to the plains of this county, particularly the low lands towards the Hudson. This is the established management of some flocks at the present time—tracts of land in the town of Fort Edward, and other tracts twenty or thirty miles distant in Vermont, being owned by the same proprietors, the latter their pasture, the former their meadow, their flocks being annually drove in the autumn to the former, and in the spring returned to the latter. To no other business can the mountain ranges of Vermont probably ever be more profitably appropriated, and they will hence settle down into this mode of management to a much greater degree than at present prevails.

Hence our anticipations are, that the hilly district forming the eastern part of Washington county, will ever abound in sheep, deriving their summer and winter keeping from the same farm, and that the level lands of the west part of the county will be devoted largely to the

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growing of hay, for wintering the flocks that will be summered upon the Vermont mountains—thus keeping up the same distinction which exists in Spain, a portion of the flocks being *Estantes* or stationary, and the others *transhumantes* or migratory.

115. *Early arrival of Merino sheep in this vicinity.*—Preliminary to an account of the present flocks of this county and the mode of their management, the time and manner of the introduction of fine-wooled sheep here, merits to be narrated; furnishing as it does, in addition to matter of historic interest, many items of information of a practical character, that are of too much value to be omitted.

As is well known, the writings of Chancellor Livingston, in the first years of the present century, did much towards turning public attention to the growth of fine wool; and a few Merino sheep imported by him from the celebrated Rambouillet flock near Paris and a considerable flock imported by the Hon. David Humphreys from Spain, have been noted as about the first and only sheep of this breed that for a time were in this country.

A Mr. Stoddard, who resided in Rupert, Vt., close upon the eastern border of this county, was a former neighbor and some say a family relative of Gen. Humphreys: and quite soon after the arrival of the Humphreys flock in Connecticut, a few of the imported sheep and a number of half-blood Merinos that had been reared from them, were obtained by him. The exact blood of the Humphreys flock has been inquired after with considerable interest of late; and I am informed by those who knew the Stoddard flock well, that the full-bloods were a kind of Paulars; they had a slight dew-lap, but had no wrinkles or folds in the skin, at least upon their bodies; they were wooly to the hoofs, but their wool was much less gummy and dirt-brown externally than in our present Paulars; and the fleeces of the bucks it is believed weighed about five and six pounds.

116. *First Merino blood introduced into this county.*—Aaron Cleveland of Salem obtained a half-blood buck from the Stoddard flock, and the quarter-blood lambs which he thus reared, were the first sheep possessing any Merino blood in this county. From the wool of these, a piece of cloth was manufactured, which A. D. 1810 received the bounty of eighty dollars at that time granted by the Legislature for the finest cloth made in each county, the judges of the county courts being the inspectors by whom this bounty was awarded.

By Mr. Cleveland and several others in this vicinity, half-blood bucks were for a number of years hired from the Stoddard flock for ten dollars per annum, or purchased for fifty dollars. The first full-blood buck

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which Mr. C. owned, was purchased some years afterwards, for thirty dollars, from Cadwallader D. Colden of Pittstown, who had obtained Chancellor Livingston's stock.

The first full-blooded buck in the county, was hired for fifty dollars, from the Stoddard flock, by the Hon. Nathan Wilson of Salem, in the year 1809. Judge Wilson hence received the bounty of fifty dollars, given by the State in each county, to the person who should introduce the first Merino buck; the letter of the statute not requiring that such person should be the actual owner of the animal. This was the first award possessing the character of an agricultural premium that was ever made in this county, and brings to our notice the additional fact that it has now for a long period been the established policy of our State government to encourage domestic industry and promote improvement by pecuniary grants from the public treasury.

117. *Effects of crossing Merinos with common sheep.*—Recently the crossing of our fine-wooled sheep with the English South Downs has been discussed and highly recommended by some writers. It was substantially a cross of this kind that universally took place when the Merinos were first imported—the common sheep of the country being mostly of English origin, and of a quality more closely allied to the South Downs than any other breed, as appears from the essays of Chancellor Livingston.

That this cross was a most valuable one is the concurrent testimony of all those who remember it. The quarter-blood Merinos were large sheep of a handsome form. The improvement in the quality and especially in the quantity of the wool was greater than could have been anticipated, the fleeces being actually heavier than those of either of the parents. The mutton, too, was not perceptibly deteriorated in quality and was augmented in quantity. But the most surprising effect of this cross was that wrought in the disposition of this animal. The native stock of sheep as is well known were of roving habits, akin to the wild beasts of the country, scaling with ease fences that retained other stock in security, and possessing a fleetness of foot that seemingly said to the wolves, "Before you have me, you must catch me." Yet the least traces of Merino blood, it is said, wholly subdued this disposition and rendered the animals tame and domestic like those of our present flocks.

It is therefore obvious that this cross was a most valuable one and that for the combined purposes of wool and mutton, nothing to excel it can probably be formed. It is doubtful, even, if it can be equalled with any of the materials that we have now at our hands.

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118. *Origin of the Wilkinson flock, White Creek.*—About this same time, also, the first Merino sheep were brought into the town of White Creek. Mr. Merritt of Troy owned a tract of land in the south part of this town, and placed upon it a considerable flock which was derived from the Humphreys stock. This flock he essayed to have managed in the Spanish mode. Two shepherds who had been educated to this business, accompanied with their dogs, were in constant attendance upon the flock, and many persons from all parts of the surrounding country were attracted by the novelty of their dress and employment, to pay them a visit. This mode of management, however, was doubtless found to be too expensive to be practised in this country, and it was soon abandoned. A part of these sheep were eventually purchased by Gardiner Wilkinson of White Creek, and formed the "Wilkinson flock," which for several years had a high reputation in that vicinity.

119. *Contract between McNish and Prince; first Merino ewes brought into the county.*—Thus upon the earliest importations of the Merino a portion of the blood had found its way into this county. At first, however, efforts were only directed to the rearing of grade sheep. Animals of pure blood were too scarce in the country and commanded too high a price to be within the reach of ordinary farmers. But ere long an avenue was opened, through which one of our citizens was enabled to enter into this business in a much more effective mode than had hitherto been here attempted.

The embargo and non-intercourse acts of President Jefferson's administration, as is well known, by cutting the country off from the supplies of woolen goods which it had been accustomed to receive from Great Britain, turned public attention strongly to the home production and manfacture of fine wool. The high reputation which this state of our affairs gave to the few Merino sheep then in the country, and the extravagant prices which were paid for these animals caused new and large importations to be made directly from Spain, in 1809 and the following years; in which William Jarvis, then our consul at Lisbon, took an active part and rendered the country a service of great value—as some of the choicest flocks in the Spanish dominions were transferred to this side of the Atlantic. This speedily reduced the price of these sheep, and brought them nearer the reach of all classes of our citizens.

Among other purchasers of these newly arrived sheep in the New-York market, was Robert Prince, a merchant of that city, who had a son established in trade at this time, in the village of Salem. This opened the way by which one of our citizens, Alexander McNish, Esq., was induced to engage in the business of raising fine-wooled sheep. A

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contract was formed between him and Mr. Prince, the terms of which were fully and explicitly expressed; and this document possesses particular interest to us at the present day, as containing authentic evidence of what was then regarded as the most essential points in the management of the Merinos, and what were deemed to be equitable terms for letting them.

The terms of this contract are briefly as follows: Mr. Prince was to furnish a buck and two ewes warranted to be full blooded Merino; and Mr. McNish was to furnish one hundred common ewes, and be at the whole expense of keeping and managing the flock for the period of seven years. The buck was not to be turned with the ewes before the first of November; and the lambs were to be weaned or separated from the ewes on the first of September. Annually, on the first day of June, half of the wool was to be delivered to Mr. Prince. At the end of the first year the hundred common ewes were to be sold, and half the proceeds thereof was to be paid to Mr. Prince. The buck lambs were to be annually divided on the first of September, and each party was thereafter to take charge of his own half of these. If either of the three full-bloods died or became imbecile, another was to be furnished by Mr. Prince, to supply its place. At the close of the seven years, the flock that was then existing was to be equally divided.

For the three imported sheep by which his part of the contract was to be fulfilled, Mr. Prince had paid eighteen hundred dollars. But, to be secure against any casualties, a pair of sheep in addition to these, was furnished by him. Two bucks and three ewes, therefore, were brought hither, and were placed upon the farm of Mr. McNish, a mile west of Salem village, October 11th, 1810.

120. *Prejudice against the Merino sheep.*—The community was at that time much divided in sentiment with respect to the utility of these sheep, many believing that in our climate they would rapidly degenerate and prove to be a curse to the country. And as an evidence of the violence of this prejudice, it merits to be placed on record, that one of Mr. McNish's neighbors, when these sheep first arrived, gave him formal and distinct notice, that if the bucks broke in among his flock, he should without ceremony, shoot them down, and should in addition thereto hold him answerable for whatever damages he could in a court of law make it appear he had sustained. Fortunately, however, for Mr. McNish, the imported sheep had nothing of that roving disposition which belonged to the common sheep of the country, and therefore never gave his pugnacious neighbor any molestation. And ere many years, it was surmised this neighbor's sentiments had undergone some

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change, Scotchman though he was, for it was observed, one autumn, he was very particular to keep his own flock in the field adjoining that in which Mr. McNish's bucks were pastured, and was at the same time very careless in keeping up his part of the line-fence.

121. *Ill-success in raising Merino lambs.*—Mr. McNish's sole experience in this branch of husbandry having been with the hardy, common sheep of the country, he was greatly disappointed with the luck that attended his operations with the Merinos. The weather through the first spring was particularly disastrous, the month of April being cold and stormy, and although the flock was well provided with sheds, and had every other practicable care bestowed upon it, it was of little avail, and the lambs died by scores. It appeared as though they had no vigor, no hold upon life, and the chilly atmosphere of our climate seemed nearly as fatal to them as though it was choke-damp. And on coming to reckon up the profits and losses of the first year's operations under this contract, instead of over a hundred common lambs that Mr. McNish might have reared from the same ewes with far less care and expense, he could contemplate himself as the owner of about sixteen half-bloods—to obtain which, he was giving Mr. Prince, fifty common ewes and their crop of wool! In view of this result, so unexpectedly disastrous, and of the talk that this matter excited through the town, he no doubt felt somewhat as did another *sheepish* man of that day, who related his experience in the following strains:

"When first Merinos blest our land
Through Humphrey's patriotic hand,
Quoth I, I'll be a patriot too,
And buy a ram, Merino true.

A hundred eagles was the price,
I paid the money in a trice,
I'll stake my fame and fortune too,
Quoth I, on what a ram can do.

Scarce had my pet began to thrive
When Spanish sheep by thousands 'rrive,
And what I ne'r had dreamed before,
My *ram* was changed into a *bore*!"

122. *History of the first Merino buck produced in the county.*—With much care, each of the imported ewes succeeded in raising a lamb. The first of these was yeaned when the half-bloods in the fold were perishing at such a rate, and as this was the first Merino lamb produced in the county, its brief known history possesses sufficient interest to merit a recital. It was a buck, and to effectually shield so choice an object from the rigors of the climate, it was resolved to place it in an

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atmosphere to the full as temperate and genial as that of the vine-clad plains of Estremadura. Accordingly a temporary barrier, the marks of which are still visible in Mr. McNish's dwelling, was erected across a corner of the cellar-kitchen, the apartment which was the main abode of the household, and here the ewe and lamb were domiciliated, so long as the boreal influence prevailed. Thus fondled, the delicate foreigner grew thriftily and gave every promise of becoming an ovine nabob. The following summer, whilst pastured with the flock at some distance from the house it was often observed and admired. But at length it appeared that some one who had been educated to the maxim that "exchange was no robbery," had passed that way. The favorite was gone, and an ordinary lamb was found substituted in its place. No conjecture could ever be formed as to who had perpetrated this act of unmitigated meanness.

Of the two other full-blood lambs one was also a buck, but to appearance so inferior to the first, that it was regarded with but little esteem, and was sold that autumn for eighty dollars, to the Hon. John McLean, senior, and his son-in-law, David Campbell, the latter of whom now commenced that experience in sheep-husbandry that resulted in the formation of the Campbell flock, one of the most celebrated flocks in the county at the present day.

123. *Corpulency of the imported Merinos.*—Worse luck, however, attended the imported ewes the second season. The lamb of one of them expired without any obvious cause, a short time after it was yeaned, and two of the old sheep ere long followed it. It may here be stated that these imported sheep were all in wretched condition as to flesh when they arrived here. They were of course regarded with too much favor to be allowed to remain so miserably poor. Good pasturage was furnished them, and in the winter in addition to what hay they desired, corn was fed to them, about a pint being given to the three ewes twice a day. Thus their keeping was liberal, but not extravagant, and they were only in fair condition when turned out to pasture the spring after their arrival. But they now took on fat surprisingly: and a twelvemonth afterwards, when put to grass the second summer, they became so excessively corpulent that they might truly be said to rival Daniel Lambert himself. And in August, the two fattest of them, apparently unable to carry themselves about any longer, quietly laid down and died. A post mortem examination showed a layer of clear fat upon the ribs full two inches thick on the outside and half an inch on the inside.

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It merits to be observed also, that for a time the young as well as the old sheep were so fat that it was feared the whole would perish.

In our own day it has been said that flocks removed from the old States to the far west often become surprisingly fat for a few years. These facts seem to indicate that there is in the sheep, when transferred to a different climate from that to which it has been accustomed, a peculiar proneness to obesity.

124. *Character of the imported bucks.*—Upon the death of the two ewes, another buck and ewe which had cost him nine hundred dollars, were furnished by Mr. Prince. As there was quite a contrast between the two of these bucks from which the flock was mostly reared and from which so much of the Merino blood now in this vicinity has been derived, some account of them merits to be preserved.

The favorite of the two first that were received was a large bodied, smooth faced, clean white wooled animal of a most stately appearance, carrying his head high and moving about with an air of dignity, as if perfectly conscious that the best blood of old Castile and Leon was coursing through his veins. Yet his wool though so clean and nice was rather thin and short, and coarsish on the hips. Accustomed to the sight of this genteel-appearing animal much disappointment was felt with the last buck on its arrival. It carried its head lower, and was to appearance a dirty scurvy-looking runnion, little worthy of being brought such a distance from the place of his birth. But all his bad marks were external, and he was truly one of the most valuable bucks that has ever been in this section of the country. Though his wool was so gummy and looked so foul and blackish externally, on parting it it was found to be of a clean pure white, very fine, and growing remarkably close and long, yielding a fleece which weighed over ten pounds. The fleece moreover was unusually even throughout, being fine upon the flanks. His legs were woolly down to the very hoofs, but that enormous dew-lap or ruffle which belongs to the Paular sheep of the present day was wanting, there being merely a slight, naked wrinkle in the skin along the throat, scarcely amounting to a fold.

125. *Smooth throated Paulars.*—The above descriptions are derived from William McNish, on whom the care of his father's flock from its commencement chiefly devolved, he being then in his boyhood. A duly authenticated certificate accompanied each of the bucks, specifying fully its origin; but that there were distinct varieties in the Merino stock was unknown here at that time. From what is remembered, it appears pretty certain that of the two bucks which were first received, that which was most esteemed and is described above, was from the

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Montarcos flock; and the other was called by Mr. Prince in conversation, "the Ardiuri (*Quere*, Aqueirres) buck." The last buck that was received it is well remembered was stated in the certificate to have belonged to the Prince of Peace; and all its marks as above recited show it to have been a Paular of the choicest kind.

Recent writers speak of a kind of Paulars as existing in this country which are nearly destitute of that unseemly and inconvenient dew-lap which extends in wavy folds along the throat and is regarded as a characteristic mark of this variety, and they suppose this kind of Paulars which is destitute of the dew-lap has been derived from some cross of the original Paular stock with the Saxons. But the information here adduced shows plainly that the very kind of Paulars alluded to, existed among the sheep that were imported from Spain, and that these were destitute of another objectionable trait belonging to the present Paulars, namely, the coarse wool upon the flanks. It is very unfortunate that this kind of Paulars has not been preserved pure and distinct, as it appears to have possessed all the excellencies free from the defects of this invaluable variety of the Spanish sheep.

126. *Causes of Mr. McNish's ill success with Merinos.*—Disasters continued to follow Mr. McNish. One of the imported bucks met with a casualty, the fourth year, that caused its death. And most disheartening of all, on the restoration of peace in 1815, wool fell to about a third of its previous price, and the value of sheep depreciated proportionally. This made him anxious to be released from his contract, and it accordingly was terminated a year or two before the time set for its expiration. The number of sheep remaining to Mr. McNish after the division of the flock is not recollected. The buck lambs having been divided annually and mostly sold to the surrounding inhabitants, not over two dozen individuals could have fallen to his share. And for ten years subsequently his flock made no perceptible increase in its numbers.

The ill success attending his father's operations is ascribed by William McNish to three causes.

1st. The tender constitutions of the sheep when they were first imported into this country. Inured to the mild climate of Spain, they were unable to endure so great a change as they experienced, when suddenly transferred thence to this cold northern region. The animal has now become acclimated and is altogether more tough and hardy than when it was first brought into the country.

2d. Inadequate shelter. It was a prevalent idea that sheep ought not to be housed or confined in a close enclosure. This was the opinion of chancellor Livingston who was the oracle of the country at that day up-

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on all matters relating to Merino sheep; and he attributes the inferiority of the French sheep, in a measure, to their close confinement "crowded in small ill-aired houses" in winter. Hence our sheep at that day were never furnished with anything more than sheds, open upon one or more of their sides, to every part of which the wind and the drifting snows frequently penetrated.

3d. Having the lambs come too early. Accustomed to the common sheep, whose lambs were often yeaned in mid-winter and survived the storms of the season, it was thought that when the birth of the Merino was deferred until April it was the utmost procrastination that nature would admit of; and hence some of the most piercing and fatal storms of the year occurred when these tender objects were but a few days or hours old.

127. *Present McNish flock.*—The present flock of Wm. McNish and one of the best Merino flocks in the county has descended directly from the stock left to his father at the time of the division with Mr. Prince. It was of a grade at that time averaging higher than three-fourths Merino, and the few full bloods among the flock, furnished the stock bucks that were subsequently employed. Two bucks were obtained from consul Jarvis in 1836, and a few ewes that had been derived from the Esq. Livingston stock were added to the flock about the same time. With these exceptions, the system of in-and-in breeding has been pursued with this flock for more than thirty years; and, little as we are inclined to favor that system,* we believe every one will admit that the sheep of Mr. Mc-

*As an illustration of the bad effects of in-and-in breeding, the following instance is related to us as having occurred in a particular neighborhood in this county. A farmer of a sour, unsocial disposition, who as much as possible avoided all intercourse with the rest of the world, and shunned asking the slightest favor of a neighbor lest he might at some time be desired to reciprocate the kindness shown him, for a long series of years bred his cattle entirely from his own stock. In consequence of this course, such a herd of mis-shapen, ungainly, big-headed quadrupeds were produced that they could scarcely be recognized as belonging to the cattle kind; and "——'s wolverines" were for a long time the butt of ridicule in the whole vicinity.

The careful breeder, upon either system, will avoid using even for a single season, any animal possessing obvious defects, for such defects once introduced in but the slightest degree, are liable to be transmitted and to reappear even after several generations have passed. To the many curious and valuable facts already on record relating to this subject, the following may be added. A portion of the fowls possessed by Constant Clapp, Esq., were formerly of the "downy" breed. But this variety, so strongly marked, had run out and entirely disappeared from his premises for eight years, when three of these downy individuals, perfect in every particular, reappeared among his flock—showing that the blood, though apparently obliterated, had yet been lurking there, generation after generation.

It was a favorite theory with the late distinguished Gen. Schuyler, a man of em-

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Nish's present flock are as healthy, vigorous, bright-looking and well-formed as those of any flock which we have among us. His sheep are somewhat tardy in arriving at full maturity, the fleeces gaining in weight until the animal is six years old, and thereafter remaining at about that point. One instance is remembered, where an ewe at the advanced age of twelve years yielded within a trifle of four pounds. One fact observed in this flock merits notice. The tags even in the lambs have become quite clean and free from wool compared with what they were ten or fifteen years ago, an indication that the flock is losing the Paular and acquiring the Escuriel traits. The flock is substantially full-wooled Merino; the sheep composing it are very even, and the flank-wool is much finer and more identical in quality with the body-wool than usual. In the present winter (1850) numbers 127 old and young, 83 being adult ewes; and at the two last shearings the fleeces have averaged 3 lb. 9 oz. each. There has been but little variation in the weight of fleeces for the past ten or fifteen years.

128. *Escuriel stock introduced by Isaac Bishop and others.*—We come now to speak of the next important step that was taken in improving the quality of the sheep of this county and that laid the foundation of several of our most celebrated flocks of the present day.

Of the Merinos sent from Spain by consul Jarvis and sold in the New York market, some of the choicest and most valuable specimens were selected and purchased by the Hon. Effingham Lawrence and some of his neighbors, members of the society of Friends, residing in Queens county on Long Island. It was the fine, clear-wooled Escuriels that they purchased, and the character of the stock which they obtained is sufficiently evinced by the fact, that for three of their ewes, the sum of one thousand dollars each was paid.

Isaac Bishop, a prominent merchant and in affluent circumstances in the town of Granville, whose connections were also with the Society of Friends, became early acquainted with the quality of these Long Island flocks, and from them brought the next pure Merino blood into the county. And during the remainder of his life, he occupied a conspicuous place

tensive observation, of deep penetration and sound judgment, that the true character of either a man or beast could be ascertained by looking at the parentage from which he had descended; and as an illustration of this, he used humorously to relate the incident, that in the early years of the Dutch trade with the East Indies, one of his ancestors, being a sea-captain, had gone thither, and returned with a wife—a Mongolian lady whom he had married in his absence. And the blood of that cross continued still to cling to the descendants two centuries afterwards, despite of all their efforts to eradicate it—so that down to the present day in one branch and another of the family, one of these confounded East Indians would occasionally be making his appearance!

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in our community as a grower of fine wool, and for several years as a purchaser also.

Soon after the restoration of peace in 1815, small droves of grade bucks were annually made up by speculators, from among these Long Island flocks, and were brought through all parts of this district for sale; and thus a tinge of Merino blood became infused into all our sheep.

The McNish and the Bishop flocks, however, appear to have been the only ones containing any full blooded animals, except stock bucks, until about the years 1820 and 1822. The high character of the Long Island flocks became generally known through our community at this period, and also the fact that pure blooded sheep could be obtained from them at lower prices than had been customarily paid for grade bucks. Pure blooded and choice animals, moreover, attracted more notice, and were more sought after now than they had ever previously been, in consequence of the emulation that was excited by the cattle shows and premiums of the old agricultural society of the county, that was then in operation. Several of our more enterprising farmers were thus induced to visit and make purchases from the Long Island flocks, five and six dollars being the price at which full blooded lambs were commonly obtained in the autumn. From the flocks of Mr. Lawrence, Andrew Cock, Timothy Matlet and Silas Titus, the purchases of our citizens were made. And it was thus that at this time, from the most renowned flocks in the country, the pure Escuriel blood became largely introduced into this county; and directly from this, some of our most noted flocks have descended, as we shall have occasion more particularly to specify in the subsequent pages.

129. *Introduction of Saxon sheep, and their character.*—Soon after the Escuriel Merinos had thus become established in this county, public attention became turned to a still finer breed that had grown out of this same Escuriel stock, transplanted from Spain to Saxony; and the owners of all our best flocks at once became anxious to obtain at least a cross with this blood. The Brighton sales of the early importations from Saxony were attended by some of our flock owners, but the prices were so extravagantly high, that no direct purchases were there made. Some specimens of this stock, however, soon reached this vicinity; and Mr. Grove's arrival among us in 1827 brought into our midst, as is well known, a large number of the choicest Saxon sheep that our country has ever received. This soon made the blood common among us, as will every where appear in the succeeding parts of this account.

The great objection to these Saxon sheep ever has been, that their fleeces were unduly light. Many of the imported sheep that first reached this district, were of this character. A flock of Saxons, pur-

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chased by Mr. Bishop in the Boston market, and brought to Granville, contained examples of this kind, that we hear of with astonishment. The fleece from large, thrifty, well-fed wethers, on being snugly rolled up and tied, was of a size little larger than a man's double fist and could be readily deposited in a hat crown and carried away without inconvenience to the wearer; and when placed in the scales, one and a half pounds was the utmost that some of the fleeces from these wethers would balance. The first flock that Mr. Grove brought into this vicinity, in the year 1827, appears to have been scarcely less faulty in this particular. Some of the stock bucks that were derived from it, it is well known, yielded fleeces which weighed only two and a half pounds! Our experienced wool-growers frankly expressed to Mr. Grove their convictions, that such thin-wooled and light-fleeced animals as this flock to a great extent consisted of, could never be made profitable in this country, and would depreciate the value of the stock then existing among us; and he was a man of too much sense and discernment in this matter not to perceive the justness of these objections. They produced a most valuable result. The next year, a flock selected by his friends and correspondents in Germany, arrived, of quite a different character. Some of the bucks from this last flock are known to have been the heaviest wooled of any of the Saxon stock that has ever been brought into this country. Indeed, many of the individuals in it were so much more thick-fleeced than any of the Saxon sheep that had previously been seen here, that it was for a time currently surmised that a part of these sheep had been obtained from Spain and not from Germany. The service that Mr. Grove has rendered our country, by introducing among us the best specimens of the Saxon sheep that have ever been brought across the Atlantic will cause his name ever to be held in grateful remembrance. But a portion of the merit which has been accorded to him belongs to the intelligent wool-growers of our own country, by whose suggestions he was prompted to make his last and most valuable importation.

130. *The Livingston flock.*—We will proceed next to notice some of the most celebrated flocks in the county, and the mode in which they have been formed. One of the largest and best known, is that of Alexander Livingston, Esq., of Greenwich. His experience in the growing of fine wool commenced in the year 1811. In the autumn of that year, he hired one of the imported bucks of the McNish flock, for the season, paying therefor, fifty dollars, and being restricted to the use of fifty ewes, from which he raised twenty lambs, whose fleeces averaged three and one-third pounds. The two other McNish bucks were

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successively hired for five dollars each. After this, other full-blood bucks were obtained from Isaac Bishop, and others, until the flock was of so high a grade that good judges to whom samples of the wool were exhibited, pronounced it pure Merino. Being in New-York in 1820, he observed a large quantity of wool stored in a warehouse, and on inspecting it, a lot was found among it, that for fineness and elegance, surpassed anything he had previously seen. Good as his own wool was, this was obviously much superior to it. He learned on inquiry, that it was derived from the Quaker flocks on Long Island; and he at once resolved to obtain some of their stock. He accordingly in the autumn of that year, repaired to Long Island, and made a purchase of fourteen lambs. Two years afterwards, forty more were obtained. Nearly all of these were purchased from Andrew Cock, with the exception of one Saxon ewe from Mr. Grove, these are all the ewes he has ever bought. His present flock has been reared wholly from these Long Island Escuriels, crossed with full-blood Saxon and Merino bucks, from Grove, Jarvis, and others. It contains over 200 sheep at this date, being much reduced from what it has heretofore been. About seventy of these are pure Merinos, seventy others are nearly pure Saxons, and the remainder are of intermediate grades. The Saxon fleeces weigh three pounds, the Merino, three and a half.

131. *The Dobbin flock.*—John Dobbin, Esq., of Jackson, about the year 1821, obtained a buck and a dozen adult ewes of the best quality as to blood, form, &c., from the Friends on Long Island. These laid the foundation of his present flock. These Escuriels have been continually crossed since with Saxon bucks, from the Grove flock, the flock of Grant and Searls, of Walpole, N. H., and some of known excellence from other sources; but not with as studious a regard to the weight of the fleece as to its fineness. The flock at present numbers about 250, with an average weight of fleece, of two and one-fourth pounds, and in fineness is in advance of any other flock in the county, being but a shade inferior to the choicest pure blooded Saxons.

132. *The Campbell flock.*—This was formed by the late Hon. David Campbell, of Quassacook, and now belongs to his son George. Judge Campbell commenced raising grade Merinos, when this blood first came into this vicinity. About the year 1822, he procured his first full-blood Merino ewes. These were of the Escuriel stock, and were obtained from the Matlet and Titus flocks on Long Island. His first Saxon bucks were from the Grove flock, and the disasters which he suffered in consequence of the foot-rot becoming introduced and spreading through his flock, will be related when we come to speak of that disease. He

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early perceived that an indiscriminate use of Saxon bucks was deteriorating the weight of his fleeces, and at once discarded all such, however pure their blood and fine their wool, unless they possessed also, comparatively heavy fleeces. The flock is at present very even throughout. So far as blood is concerned, it is nearly pure Saxon, with but a lingering trace of Escuriel Merino. In fineness, it is only surpassed by the Dobbin flock, and perhaps by some of the off-shoots from that flock. For wool of so fine a quality, it possesses a length of staple, and heaviness of fleece, that is probably nowhere excelled. Hence stock-sheep from this flock are more in demand than from any other flock among us; and a considerable portion of some of the other flocks in our county has been derived from this. It at present numbers 380 individuals, of which 100 are lambs, and 200 adult ewes. The flock is summered eleven miles distant from the homestead, upon a hilly tract in Sandgate, Vt., and is wintered upon hay alone; and with this keeping the fleeces average three pounds in weight.

133. *The Clapp flock.*—This formerly ranked with the preceding, for many years, as one of the four best flocks in the county. It was formed as follows: About the year 1827, 225 ewes were obtained from Mr. Judson, of Lower Arlington, Vt., to be returned with a pound of wool for each sheep, one year thereafter. They were clean-wooled Merinos, of a high grade, but not full-bloods. A yearling Saxon buck was purchased of Mr. Grove, and ten ewes were daily turned in with the buck, commencing November 10th. One hundred and fifty-six lambs were thus obtained, all of which were reared. These formed the basis of the flock, the subsequent stock-bucks being Saxons from the Grove, and the Walpole (Samuel Grant) flocks. But the low price of wool for several years past has induced Esq. Clapp to sell out his flock, under the settled conviction that every sheep upon his premises was a clear loss to him of several shillings annually—a loss which his circumstances would not enable him to endure. He now keeps but a limited number of ewes for the germ of a future flock, should prices warrant its formation. These in point of blood are nearly pure Saxons, and shear from 3¼ to 4 pounds each.

134. *The Milliman flock.*—Thomas Milliman of Salem, about the year 1821, gathered a flock of full blood Merinos from the McNish, the Bishop and the Judge McLean flocks, and was the first owner of a Saxon buck in the county, which buck is otherwheres noticed in these pages. From the Searls importation of 1826, two ewes and a buck were obtained at an average cost of eighty-eight dollars each. But his present flock has come in this wise. In 1830 the hay crop along Connecticut

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river was remarkably light and consequently all kinds of stock in the autumn became unusually low. Availing himself of this depression, Mr. Milliman, in Northampton, Plainfield and other towns in that direction picked up a flock of 188 sheep of a high Saxon grade and many of them full bloods, at a cost of about four hundred dollars. Some of the purchase was from the flock that had belonged to Col. Shepherd, well known as containing the first sheep that were brought into this country from Saxony. Of his bucks eight have been obtained from Mr. Grove, others from the Livingston and other Saxon flocks, and some have been used that were reared from his own stock. The flock is one of the finest wooled and the fullest Saxon blooded in the county. It at present numbers 500 and the fleeces average two and a half pounds.

135. *Other flocks in the county.*—In addition to the flocks already spoken of, the following are the more considerable ones in the county at this date. And it will be borne in mind that in consequence of the low prices of wool for several years past, nearly all of our flocks are at present much reduced in numbers, and several that were in existence when this branch of business was in a prosperous state, are now broken up.

In the town of White Creek, Stephen Barker has a flock of 2500; Mrs. Sarah Hanna, formerly 3000, now reduced to about 2000; Simeon Sweet, 2000; James McKie, 1000, derived mainly from the Campbell flock; John McKie, George Barber, James Lake and Ovando Perry, about 700 each. The broken and mountainous district in the northeast part of this town is less adapted for tillage than the lands in most of the other towns of our county. Extensive tracts consequently are here possessed by single proprietors and stocked mostly with sheep. Hence large flocks come to be owned so much more in this than in the other towns.

In Cambridge, John Lee and George McKie keep each about 1200; Calvin Skinner, a very nice flock of about 700; Dr. P. V. N. Morris and Thomas Green, 500 each.

In Jackson, in addition to the Campbell and Dobbin flocks already noticed, Lewis McLean, Henry McLean, Elisha Billings and Seeley Billings have flocks numbering from 4 to 500 and Peter Hill a choice flock of about 300.

Though Easton contains many nice flocks they are of a quality somewhat below those of the towns to the east of it. The largest flock-owners are Jonathan Hoag 1000, Stephen Batty 800, Job Eldridge, an excellent flock of 500; Royal Slocum and Mrs. Dr. Morris about the same number.

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Greenwich has several valuable but mostly small flocks. The largest are those of Archibald Shaw and Thomas Rogers, 400 each.

In the town of Salem, the Milliman and McNish flocks have already been specified. In addition to these, the brothers Levi, David and William Gray own about 1000; William Edie 800; Stephen R. Gray 600; the brothers Thomas and John Law, 600. Along White Creek above Salem village, Aaron Cleveland, Robert Wilson, Isaac Sherman, George Hopkins, Sceley Sherman and Nathan W. Wilson keep each between 4 and 500. Most of these last are of a grade somewhat below half blood Saxons, and have some of the blood of the native sheep of the country still remaining among them.

In Hebron, the flock of John Armitage, 400 in number, is the finest in the town. William and Gordon McClelland have 4 to 5 10, as have also each of the three Braymers, brothers, and Daniel Parish, these last being of a grade below pure Merino.

Granville has many fine though small flocks. The largest, that of John Barker, numbers 400.

In Hartford the flocks are mostly grade-wooled—the native sheep of the country crossed with Merinos and a sprinkling of Saxon, ranking at about three-fourths Merino. Solomon Smith and —— Murrell have about 600; Joseph Russell 500; —— Arnold 400; each of the five Braytons, brothers, 250 to 500; Harvey Brown, a well kept flock of 250.

Some large fine flocks formerly in Argyle are now broken up. The best flock at present in town, that of John Shaw, numbers 400.

In Fort Edward, Lansing G. Taylor keeps 500.

The largest flock in Kingsbury is owned by William Baker, and contains 900.

In Fort Ann the flocks of the late William A. Moore, 600, and Benjamin Barnett 300, were for several years the finest in this section of the county. Others are now of much the same quality; among them are those of James Farr and Maj. William Baker.

136. *Weight of Merino and Saxon buck's fleeces.*—The weight of fleece particularly in stock bucks, is much more attended to now than it was formerly, experience having taught many a severe lesson in this matter; and it will interest the reader to be informed of the merits possessed by different animals that have been among us, of known purity of blood in this particular. A few examples that have been promiscuously gathered are therefore subjoined.

A Merino was a few years since raised by Esq. Livingston, out of a buck obtained from consul Jarvis, the fleece of which exceeded ten pounds.

A Merino that Esq. Livingston purchased of Mr. Cock on Long Island, produced a fleece weighing 8¼ pounds.

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William McNish in 1835 purchased from consul Jarvis a Merino lamb which yielded 5¾ pounds at its first shearing, and at its sixth, 7 pounds and 11 ounces. A second lamb obtained at the same time, yielded at each shearing about one ounce less.

At the first fair of the county agricultural society, John McDonald received the premium for the best Merino buck; a yearling from which 7 pounds of clean-washed wool had been sheared the preceding spring. This also was from a buck from the Jarvis flock.

Esq. Clapp's present stock buck is a Saxon, raised by himself, which yielded 6 pounds and 14 ounces at its last shearing.

The first Saxon blood that was owned in the county, was a second handed buck bought by Thomas Milliman for one hundred dollars. This was one of the six sheep which Mr. Grove brought over on his own account when he first came to this country in 1824, and was several years afterwards recognized by him, with some emotion, as the identical animal which an aunt of his had presented to him as he was paying her his last visit ere crossing the Atlantic. Its fleece weighed 6½ pounds.

One of Mr. Milliman's present stock bucks is an animal raised by himself; a pure Saxon yielding also 6½ pounds.

Another Saxon raised by Esq. Livingston and bought by Mr. Milliman four years ago, yields 6 pounds and 1 ounce.

A Merino of the chancellor Livingston stock bought by Aaron Cleveland of C. D. Colden, Pittstown, yielded a fleece slightly under 6 pounds.

A Saxon bought by Mr. Milliman out of the last flock imported by Mr. Grove, for one hundred and twenty dollars gave a fleece weighing 5¼ pounds.

Four Saxons, bought when yearlings for fifteen dollars each from the Grant flock at Walpole, N. H., by Messrs. Dobbin, Clapp and others twenty years ago, sheared when mature, between 3 and 4 pounds each.

Esq. Clapp obtained a buck from Mr. Grove in 1830, whose fleece at its second shearing weighed 3½ pounds.

The first Saxon buck owned by A. Cleveland was from Mr. Grove's flock, and yielded scarcely 3¼ pounds. "I paid ninety-five dollars for him (says Mr. C.) and had I knocked him in the head as soon as I got home, I should have been a gainer."

The second Saxon that was owned by Mr. Milliman, was an imported buck, bought at Brighton in 1826. Its fleece varied but a trifle from 3 pounds.

A Saxon known to be full-blooded, bought by Mr. Milliman at Northampton, Mass. in 1830, yielded less than 2¾ pounds.

Esq. Clapp bought a yearling buck of Mr. Grove on his first arrival

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in this vicinity, for one hundred and ten dollars, which, when full grown, produced a fleece of but 2¼ pounds.

A polled buck from Mr. Grove's first flock, owned for a time by Mr. Germond of Lansingburgh, yielded only 2½ pounds.

137. *Influence of keeping, on the weight of the fleece.*—It is a well-established axiom that the keeping of a sheep has a great influence on the weight of its fleece. A pampered sheep will yield a heavier fleece and a half-starved one a lighter fleece than otherwise. Of several examples illustrating this fact, the following are as clear and conclusive as any that have been related to me.

William McKie several years since purchased a number of sheep from the Dobbin flock, already noticed as the finest in the county, with fleeces never exceeding 2¼ pounds in weight. To these were given about twice the extent of pasture range to which they had been accustomed and some grain was fed to them during the winter. The weight of their fleeces arose to an average of 3¼ pounds the following year. They continued afterwards at this mark, till they passed into the charge of another person, who wintered them upon hay only, whereupon they immediately fell back to 2¼ pounds.

George M'Kie lately purchased a lot of ewes from the Campbell flock, where the average weight is three pounds. These, however, the next season yielded fleeces which averaged four pounds.

138. *Fineness.*—Next to the weight of the fleece its fineness is the point that is most looked to by our flock-masters. Unfortunately, here we have not that accurate and ready test that we possess with regard to its weight. The eye is wholly unable to discriminate the nice shades of difference that exist between samples of nearly the same quality. Almost every man, therefore, believes his wool is finer than the buyer will admit it to be. And the most experienced buyers are unable to distinguish accurately all the minute variations that exist among several lots of wool. Hence with them as well as the owner, the precise degree of fineness is frequently a matter of guess work.

The method resorted to in Germany (Patent Office Report, 1847, p. 280), namely, placing single fibers upon a polished block of a jet black color and ascertaining at what distances from the eye the fibers of each sample are visible will no doubt enable one to determine with a considerable degree of certainty which of the samples is finest and which is coarsest. But this cannot be regarded as an accurate test. Two persons will see very differently. Physiologists will tell us that an interested person eager to produce a particular result will under the excitement, have a degree of visual power and energy that may enable him distinctly to see a fiber of wool that may be a shade finer than his own,

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at as great a distance as he can perceive his own. Have not some fibers, moreover, more glossiness than others? We think they have. These will therefore reflect the light more strongly and be visible at greater distances than will coarser fibers that are more opake. We cannot but regard this test therefore as liable to be deceptive and unsatisfactory.

There is, however, a mode of ascertaining the fineness of wool that is perfectly accurate and reliable. We allude to the compound microscope. Attention was a few years since directed to this test by Dr. Emmons, and illustrations of it given in the American Journal of Agriculture and Science, vol ii. p. 85. The best instruments of this kind are capable of magnifying the finest fibers of wool to the size of pipe-stems or larger, and a person skilled in the use of the instrument can measure and tell off the diameter of each fiber with about the same accuracy that the size of the saw-logs in a mill-yard can be determined. Unfortunately, however, such instruments are rare and expensive, and the community at large is therefore unable to avail itself of the definite knowledge they are capable of giving.

An instrument of lesser power which I possess, shows that there is scarcely any difference in fineness between samples of the fleeces of some of the best Saxon bucks imported into the country twenty-five years ago, and those of our finest present flocks. But that most of our Saxon stock has deteriorated from what its ancestors were, is very manifest. This deterioration, however, is attributable wholly to the management which the sheep have undergone. The day has not yet arrived, when we can drive our sheep under cover whenever a shower is coming up, house them ere the night-dews begin to fall, or keep them as it were in a green-house during the cold months of the year to obtain a fleece of exquisite fineness and less than a pound in weight. The market has governed this matter and has made our flocks what they now are. At no time, and least of all of late years, has it paid for the finest wool what it has cost to produce it. And our utilitarian farmers having become convinced that heavy fleeces of medium fineness gave them the best returns, have made it their endeavor to grow such fleeces. This has produced what deterioration has taken place from the fineness of the imported sheep.

139. *Influence of keeping on fineness.*—What the fleece gains in weight by high keeping, it partially loses in quality. This is the current opinion; though to demonstrate it, requires such a discrimination of the nice shades of difference that exist in fineness as no one among us has the requisite facilities for making. The opinion, however, is so

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rational as scarcely to need the evidence of an actual demonstration. High keeping cannot add to the skin of the sheep an additional number of bulbs or glands for secreting woolly fibres; it can only increase the activity of those already existing there, thus causing them to elaborate the matter of wool more rapidly; like a sieve or strainer overloaded with material, a greater quantity and of a grosser quality passes through. Hence, on the best established physiological principles, with the fact ascertained that high keeping increases the quantity of wool, it will follow that it does so by increasing both the diameter and the length of the fibers, but not the number of them. If high keeping increased only the diameter of the fibers, nothing would be gained by it, as the additional weight would then be wholly at the expense of the fineness. But it adds to their length also, we must believe, in the same ratio that it adds to their diameter. High keeping, therefore, cannot be regarded as either vain or pernicious. The only valid objection to it is on the score of economy.

140. *Jar or hair.*—This is another point which is looked to by all our more intelligent wool-growers. As in most other quadrupeds, so in the sheep, the coat is composed of two very different kinds of hairs; the main growth being of a finer quality and shorter; but interspersed more or less among this is another set of longer, coarser, and often differently colored hairs, which project considerably beyond the others. In the sheep it is the former that constitutes the wool, and the latter is called jar or hair. This hair was most abundant in the former native sheep of this country, often projecting an inch or two beyond the wool and giving the animal a shaggy appearance akin to that of the goat. It prevails more or less among all varieties of sheep. The Paulars have it more than any other of our fine-wooled breeds, but the Saxons are not exempt from it. It is a great deterioration to the quality of the wool, and hence every good breeder endeavors to rear sheep as free from this defect as possible. In the fine-wooled sheep it is frequently so thin and fine as not to be perceptible to the naked eye when looking directly upon the wool; but often when a sheep, apparently devoid of this hair is brought between the sun and the eye, innumerous fine fibers projecting out beyond the ends of the wool are readily seen. It has heretofore been customary with us, in assorting flocks, to reject from the first class every individual in which any of these hairs were detected.

141. *History of the market, and prices of wool.*—When the Merino sheep were first introduced among us, nothing like a market for their wool was possessed by our citizens. It was only occasionally that an oppor-

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tunity was enjoyed of turning this staple directly into money by selling it to some manufacturer. The common practice of the grower at that time was to have his wool manufactured into cloth on his own account, and place this cloth in the stores of the vicinity, to be there sold on commission.

During the war of 1812, 1815, full blood Merino wool was worth about two dollars per pound, and some sales of half-blood Merino were here made to our manufacturers, at that time, for one dollar. But on the close of the war, it soon fell to about half of these rates.

About the year 1820 the owners of some of our best flocks were accustomed to take their wool for sale to the city of New-York. For the finest wool of the Long Island flocks seventy-five cents per pound was paid in that year, and sixty-two and a half cents for the quality furnished from this county. It was somewhat lower the following years.

In the year 1825, Isaac Bishop, of Granville, commenced purchasing wool, and this was the first of anything like a regular market for it within the county. Since that time the buying of wool has become an immense business among us, in which several persons, residing mostly in Salem, Cambridge and Granville, have engaged, a part of them acting commonly under commissions from the eastern manufacturers. And the wool market in these villages has become so extensively and favorably known, that a large amount of wool from the western part of Vermont and the surrounding counties in this State is brought to them for sale. The purchases thus made by wool merchants resident in the county, for many years past, has amounted to about 400,000 pounds annually.

In 1825, 50 to 52 cents were paid for wool of the best quality. In 1827, 36 cents. In 1829, 50 cents.

An inspection of the books of some of the principal buyers, from this period to the present time, shows that the following prices have been paid by them in successive years. We give what appears to have been the range of prices for the common lots of wool grown in the county, and also what we find entered as the highest price or that which was paid for the best lot that was purchased in each year. It should be remarked, however, that in some years the finest lots have not been offered for sale. The common lots are such as rank in market between grade Merino about three-fourths blooded and full blood Merino.

In 1831, 60 to 78 cents were paid for the common lots and one dollar for the finest.

In 1832, 30 to 40 cents. The four finest lots in the county at this date were those of Dobbin, Livingston, Campbell and Clapp, who sold for 52 cents.

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In 1833, 38 to 50 cents, and about 65 for the finest.

In 1834, 30 to 45 cents, and for Livingston's, 70.

In 1835, 40 to 52 cents and later in the season 48 to 65, at which time Dobbin, Livingston and Clapp sold for 82½, Campbell for 83. There was the most excitement in the wool market this year that we have ever had. A firm in Salem bought largely, and the prices soon after depreciating, they were ruined thereby.

In 1836, 40 to 56 cents, and for the finest 68 to 75.

In 1838, 31 to 40 cents, and 50 for the finest.

In 1839, 45 to 54 cents, and 63 for the finest. One of our buyers this year unfortunately retained on his hands his year's purchases the average cost of which had been 52½ cents. After keeping it till the third year, despairing of doing better, he effected a sale for 30 cents, sinking thirteen thousand dollars thereby.

In 1840, 33 to 40 cents, and 45 the highest.

In 1841, 35 to 45 and for the finest 50.

In 1842, 25 to 30 " 35.

In 1843, 23 to 30 " 45.

In 1844, 30 to 40 " 47½.

In 1845, 25 to 33 " 40.

In 1846, 25 to 30 " 38.

In 1847, 28 to 37½ " 46.

In 1848, 25 to 31 " 40.

In 1849, 28 to 34 " 40.

The wool is mostly purchased in June, July and August, at which times the prices above cited have been paid. Some, unwilling to part with their wool at the prices then current, have obtained a higher price a few months afterwards and at other times have kept their wool on hand two or four years ere they could realize the sum they had placed upon it. In some instances wool after being retained two or three years has been sold at a price below that which was at first offered.

The above statement is particularly important as showing how variable the price of wool in our market has been. No other commodity produced by our farmers has undergone such fluctuations. And this has been the most disheartening circumstance connected with this business.

Another fact merits a passing remark. There is by no means that degree of discrimination now made between the different qualities of wool that was made fifteen years ago Among the common wool of the county a difference of about twelve cents was then made between the coarse and the fine, whilst of late years it is only half of that amount.

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Our finest wool, moreover, then brought fifteen to twenty cents more than the best grades of common wool. It now brings but about eight cents more. This may be in a slight degree attributed to what is probably a fact, that the wool now grown is more even and nearer to one quality than it then was. But there has been no change in this respect at all proportionate to the change in the market rates. These rates show that the growing of wool of a high grade of fineness is much less of an object now than it has heretofore been.

142. *Most profitable sheep.*—A heavy fleece, and a fine one are incompatible. This is the testimony of all our wool-growers. In other words, it is impossible for human skill to unite the fineness of the Saxon with the weight of the Merino. But that some approximation towards this is attainable is not doubted.

It becomes an important question to determine which kind of sheep is the most profitable. As has been already intimated, the opinion has here been prevalent for many years, that heavy fleeces afforded a better return than fine ones. And the range of the market price for several years past, indicates that this opinion is well founded. Every one will admit that fleeces of a high grade of fineness, can scarcely be made to weigh two and a half pounds; whilst a quality equivalent to full-blood Merino, can with little difficulty be made to weigh three and a half pounds or more. Then, as prices have been for six years past, one dollar and five cents would be the average return annually yielded by a fine-wooled sheep, and one dollar and nineteen cents the return from a heavy-fleeced one. The latter would consume a somewhat greater amount of food; the former would be a more delicate animal and would require somewhat more care and attention. In view of all the facts, there can be little difference of opinion upon this subject. The heavy-wooled sheep must be regarded as the more profitable. And in forming a flock at the present time, the intelligent wool-grower would adopt a standard the reverse of that by which the agents of the Saxon Elector culled the Escuriel flock in Spain, nearly a century ago. Heavy fleeces of medium fineness being the object, he would select sheep possessing short thick necks, and broad across the fore-shoulders. With these marks, the body will generally be of the desired kind, and like the Dutchman's horse, "a big one when it is lying down." This is the form which, in conjunction with a fair degree of fineness, has had the preference among us of late, without any particular regard to the point whether the blood was Saxon or Merino.

The question, "If you was now purchasing a flock of sheep, what kind would you select?" is answered by two of our most experienced and intelligent wool-growers, as follows:

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Says Esq. Clapp, if I was raising wool to make cloth for my own use, I would prefer the finest thick-wooled Saxons I could obtain. When both are manufactured alike, and an equal weight of wool is put into a yard of cloth, the piece that is made of fine wool will be a third more durable than that which is made of coarse. But cloth made of fine wool, is commonly made lighter, and is sheared so close, and dressed so smooth to make a nice article of it, that its durability is materially diminished. On the other hand, if I was raising wool for sale, as prices now are, my preference would be a flock of the heaviest fleeced Paular Merinos, or rather a cross of ewes of this kind, with the heaviest fleeced Saxon bucks. To the question "would not such a cross produce a flock essentially the same as the Escuriel Merinos?" Esq. Clapp, says, I think it would be coarser and heavier-fleeced; for, judging from the Escuriels that I have owned, they are in no wise different from the heavier-wooled Saxons. Two pounds and a quarter, is about the highest that fine Saxon fleeces can be got to weigh. Pure Paulars may be got, that without extravagant keeping, will give fleeces of five pounds or more; and a cross that will improve the fineness without greatly diminishing the weight of these, I regard as the most profitable sheep a man can obtain.

Says Esq. Livingston, sheep of a lower grade than full-blood Merino, I should not think of purchasing. With regard to the relative merits of Merinos and Saxons, my only definite knowledge is the following: At their first shearing, I once weighed the fleeces of eleven of my pure Merino ewes, and twelve of my highest grade Saxons. Each weighed precisely the same, namely, thirty-five pounds. And if I was without any sheep, and about to purchase a flock, I do not know as I should have any preference between the Merino and Saxon blood. The Saxons are the cleanest, prettiest looking sheep, and it is pleasanter keeping such a flock; but I regard one as just about as profitable as the other, as the market price of wool ranges.

143. *Pasturage.*—Before considering the expense, it is necessary that we speak of the mode in which sheep in this district are generally kept, and we therefore proceed to state the leading facts with regard to their management.

It is about the middle of April that grass is commonly up, sufficiently for turning sheep into the pastures, and that feeding with hay ceases.

Upland and hilly pastures, affording a short, sweet, and nourishing herbage, are those in which most of our sheep are kept, our interval lands being devoted to meadows, or if to pastures, cattle and horses rather than sheep, are turned on to them. Some farmers, however, on

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the west side of the county, whose farms include no hilly uplands, keep sheep with success.

It is a prevalent custom to have a particular part of the farm devoted to sheep pasturage, and here they are turned year after year. That part of the farm which is most uneven and least adapted for easy tillage, is the portion which is usually applied to this use. This is also the portion which is commonly situated most remote from the house and barns, and to which therefore, it is laborious to draw manures for its cultivation. It saves steps, moreover, to have the pasture lands which are situated near the dwelling, assigned to the cows and horses, inasmuch as these require to be got up daily, whilst sheep require to be visited but once a week.

The woodlands of the farm also occupy its most hilly and remote part, and are commonly included in the range given to the sheep. They here gather much nutriment that would otherwise be wasted But as they browse down every thing within their reach, from those tracts where it is desired that the undergrowth should spring up to wood, it is necessary to exclude them; and this is accordingly done by many proprietors at present, whose practice was formerly different. The most economical mode of management in this matter undoubtedly is, to take what wood is required for the annual supply, from a particular part of the wood lot, cutting the land there clean of everything, and surround the spot thus cleared with a temporary fence, sufficient to keep the sheep from getting on to it for two or three years, until the new growth has started up beyond the reach of the sheep, whereupon the fence may be removed to inclose another tract similarly cleared. In this way the flock may be allowed to range through the remaining parts of the woods, where they will gather an amount of herbage that will abundantly repay the slight expense of the management stated. The quantity and variety of the vegetation gleaned by sheep in their woodland ranges is well known only to the botanical student, who is often much vexed to find that every flower and weed and the leaves of every low shrub have from this cause disappeared from localities where but a short time before he had met with them growing in luxuriant profusion. Indeed sheep walks, whether forest or cleared land, are noted by herbalists as being the most barren grounds for their pursuit that they any where encounter; every plant and spear of grass, save a few acrid herbs, being there gnawed down so close that the humblest flower is never able to make its appearance. This variety and amount of herbage that springs up in our woodland shades certainly conduces much to the nourishment and probably to the health also of the sheep, and therefore,

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whenever it is practicable, they should be permitted to gather it rather than to have it wholly wasted.

Pasturage for many of our flocks is obtained upon the mountain lands east of us in Vermont, and thither they are driven after shearing, and remain till autumn. These lands being comparatively cheap, some of our sheep owners have become proprietors of tracts there purposely to keep their flocks thereon during the summer season, where pasturage is hired, one and a half to two cents per week, or three to four shillings by the season, is the common charge. But sheep diseased with the foot-rot and the scab are much more common among the Vermont hills than here; and sound flocks sent there are liable to return with these diseases, tainted sheep having broken or been taken into the same pastures. For this reason, our flock owners have become chary about sending their sheep from home for pasturage, and the practice is less prevalent now than it has been heretofore.

The lands devoted to the pasturage of sheep are so variable in the quantity of grass which they yield, that nothing very definite can be said as to the number of acres which are required for a given number of sheep. The amount is larger than most people are aware of. One of my informants says, it will probably be as close an approximation to the truth as is attainable, to say that of the pasture lands of this county, about twenty-five acres are required for a hundred sheep. Another says that a hundred sheep need about fifty acres. Of the hilly lands and bleak, ledgy tracts where our flocks are mostly kept, probably this last stated quantity is required. The writer had supposed that a hundred sheep might be kept on twenty acres. An experience, however, of several years shows that this quantity is scarcely adequate for that number. But that twenty-five acres of good pasturage is ample, he is confident.

144. *Water.*—Our enclosures for sheep are always so arranged as to have the water of a brook or spring in some part of them. Yet in the dry period of the year, these often fail and some pastures are without any water it may be for weeks, and without any obvious injury resulting to the sheep from this privation. Whilst all, therefore, deem it the better plan to have water always within reach of the flock, all know that it is not essential. It is the prevalent and probably correct opinion, that the animal in this matter accommodates itself to the circumstances of its situation, and is accustomed to feed more when the dew is on the grass when no water is within its reach.

Many of our yards in which sheep are wintered are unprovided with water, the owners deeming that they by eating snow, render water un-

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necessary. But this is not the prevailing opinion, and water is commonly supplied to these yards, through lead pipes, or the flock is allowed access to some running brook near by.

An interesting fact may be stated in this connection. In one of our sheep-folds to which water is brought in a lead pipe, it was originally arranged to be thrown in a jet horizontally from the penstock into a trough. But the proprietor soon observed that the whole flock, instead of drinking the water from the trough preferred catching it in the jet. The trough was consequently taken out of their way. The fact shows that water clean and sparkling is more refreshing and grateful to this animal, than that which is deadened slightly by standing in a trough.

145. *Salt.*—Some keep salt constantly accessible to their sheep, in boxes, or the concave surface of large stones in the pastures. But it is the prevalent practice to feed them salt regularly, once each week, by dropping a handful here and there upon the ground. Many, however, are careless in this matter.

Some never feed any salt in the winter season, alleging that it makes the sheep thirsty and feverish. But we must believe that it is nearly as necessary for their health in winter as in summer, and if placed in a box under a shed where they can taste it whenever they please, it will not produce the effect ascribed to it.

146. *Winter arrangements and shelter.*—Late in the autumn, when the grass remains frozen during most of the day, a few locks of hay or bundles of stalks are sometimes flung out to the sheep. But it is not commonly till the ground is covered with snow that they are brought to the barn and that foddering regularly commences. They are now separated into two or more flocks for the winter. Not more than a hundred or a hundred and fifty sheep should be enclosed together in one yard. Where the flock contains two or three hundred sheep it is commonly divided into three parcels. One of these contains all of the most healthy and vigorous subjects; the second contains those that are more thin in flesh and feeble; and the third embraces the lambs. Small flocks of a hundred or less have only the lambs and perhaps a few invalid sheep placed in an enclosure apart from the main flock.

The strong sheep are often driven to a stack that has been built upon a knoll or other part of the meadow that needs fertilizing, and are there kept through the winter. Sheds are here provided for them, or not unfrequently they have no shelter whatever save the leeward side of the stack. One of my informants is under the necessity of having his strong flock on a lot four miles distant from his residence. They are consequently foddered but once a day; yet they are passing the winter in as good condition as his other flocks.

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The "hospital flock," as it is frequently termed, and also the lambs, are placed each in separate yards, contiguous to the barns, where they have ample sheds for their protection in inclement weather, and can be regularly fed and carefully attended to. As the raw wind of a driving storm and often the snow also, penetrates to every part of open sheds and the most exposed portion of the flock is therefore but little better sheltered than if it was wholly out in the storm, many prefer stables or enclosed sheds with only a door for entrance. And some are accustomed to close the door and confine the flock every night, and not let it out at all upon stormy days. As sheep in a storm habitually stand all day huddled together in a small space, it is maintained that they are better off to be kept warm and dry in a stable even if huddled there into nearly as small a compass. Thus, one of my informants appropriates to a hundred sheep a stable thirty feet long and ten in width, hereby allowing but three square feet to each sheep. Here they are enclosed every night and all day in stormy weather, being fed in a rack the length of one side of the stable. This space is deemed sufficient for that number of sheep, and no injury has ever resulted from such close confinement, except that sometimes towards the latter part of the season, the wool has been slightly started on the sides of some of them in consequence of rubbing so much against each other.

147. *Winter feeding, hay.*—At the present time, hay is the chief, I may say the only article of food on which our flocks are sustained during the winter season. Well made hay of a good quality, it is admitted on all hands is the only kind that is suitable for sheep. Coarse sedge and bog hay they will not touch. Short hay, that grows in natural meadows, containing some timothy, but consisting mostly of red-top, and a variety of other grasses, is far better than the clean timothy that is cut from newly seeded fields. It should be fed regularly, thrice each day. Almost every sheep-yard is furnished with mangers or racks for feeding, for where it is scattered on the ground, much is wasted by the heedless animals running over it. The common mangers in use, which are about as good and as economically made as any, are square boxes formed of rough boards, the length of the board, and about three feet wide, without bottom or top, and with an opening the length of each side, sufficiently wide to admit the head but not the body of the sheep. The hay is thrown in at the top, and whenever the bottom becomes filled with snow, ice and grass-seeds, these boxes are readily elevated, or set on to other spots in the yard.

Though hay alone is mostly used for wintering sheep, every farmer adapts himself to the amount of his supplies of this and other kinds of provender. If his store of hay is short, straw is made use of once a

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day, or unthrashed oats, which latter are regarded by most of our farmers as being as economical, thus alternated with the hay, as hay alone. Corn-stalks too are excellent for sheep. And when we recur to the fact that there is no other one of our domestic animals, that relishes so many different species of vegetation as does the sheep, we seemingly are doing violence to its nature when we confine it to dry hay alone nearly half the year. Unthrashed oats, or some other food once each day or each alternate day, will probably keep a flock in better condition than an equal value of hay alone.

Thus with one kind of food or another, every husbandman makes it a point to keep his flock constantly in good order, well knowing that if this is not done, he will be a loser thereby, ere grass comes in the spring. Sheep, more than any other stock, must not be allowed to become poor. Whenever a sheep gets so weak that it is unable to stand, (as some will where a flock is scantily kept,) all efforts to recruit it are unavailing. Once down, it is down forever.

About five or five and a half months is the length of time sheep require to be foddered with us; and the keeping of ten sheep, is currently regarded as equivalent to that of one cow. Fourteen or fifteen tons of hay is the least that a hundred sheep can be carried through the winter upon, and if fed more liberally, they will easily consume twenty tons without any waste.

148. *Grain and roots.*—It was formerly the universal custom, to feed grain to our sheep, and it was currently believed that in addition to hay, grain or roots was essential to keep them in fair condition. Oats, shelled corn, corn and cob-meal, coarsely sliced potatoes, ruta-bagas, carrots and beets are all eaten with avidity by sheep, and one or the other of these, formerly constituted a part of its daily nourishment during the winter. English turnips were less esteemed, particularly as they become so corky towards the close of the season, when extra food is most essential. But all these dainties are now generally withheld, except to the invalids and the lambs. In consequence of the depreciated value of its fleece, the animal itself has been a sufferer, equally with its owner. It is now a stranger to the generous fare with which it was formerly served. Dainties can no longer be afforded to it. From minced pies, it has been brought down to plain rye and indian, and has been made to know that it must subsist upon this, or not subsist at all. The fact has hereby been well established, that sheep can be carried through the winter upon hay alone. And it is the remark of many, that their flocks appear to do just as well upon this as heretofore, when grain or roots were daily fed to them.

149. *Expense of keeping sheep.*—As we have already seen, the annual income from sheep, of the kind of which most of our flocks are com-

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posed, has of late years, been less than one dollar and twenty-five cents each. Nay, it is known to be a fact, that many of our common flocks in some of these years, have brought their owners a return of only seventy and eighty cents to each sheep. How this compares with the expense of their keeping, we come next to examine.

The current charge for pasturage is from one and a half to two cents per week. The first of these sums is the lowest for which pasturage is ever hired and it is only upon the mountain lands adjoining us in Vermont that it can be obtained for that price. And the time required in driving and occasionally repairing hither to see to the welfare of the flock is more than equivalent to an additional half cent. Sheep are pastured somewhat more than half the year; say thirty weeks. This at two cents per week amounts to sixty cents. When pasturage is hired by the season, however, as it sometimes can be, the current charge is fifty cents.

About the same result will be arrived at in another mode of estimating it. Twenty-five acres of good pasture land is regarded as the least that is adequate to sustain a hundred sheep. Such land is sometimes bought for twenty-five dollars per acre, though it is currently valued at five or ten dollars higher than this. Six hundred and twenty-five dollars then may purchase the requisite amount of pasture land for maintaining one hundred sheep. Thus, without taking into the account the cost of keeping up fences, &c., the mere interest on the value of the land will be forty-three dollars and seventy-five cents, or forty-three and three-fourth cents for each sheep. On the whole, therefore, fifty cents must be regarded as the lowest sum for which a sheep can be kept through the summer.

With respect to wintering. Fourteen tons of good hay is the least quantity that any one supposes the strictest care can carry a flock of one hundred sheep through the winter upon, and more than this is usually fed. The established price of hay with us, in ordinary seasons, is six dollars per ton. This amounts therefore to eighty-four dollars for the flock, or eighty-four cents for each sheep.

Such, from all the information I can gather, appears to be a fair estimate of the expense of keeping this species of stock. The estimate is made as low as the facts will warrant. In addition to this we have a number of minor items very variable in amount, according to circumstances, and hence impossible to reckon up with any degree of precision, such as the time spent in foddering and other necessary attentions, the cost of washing and shearing, the value of salt, tobacco, tar, spirits of turpentine and other six-penny etceteras that are yearly required. It is commonly estimated that the increase of the flock, under ordinary circumstances, no more than makes good its own losses and balances these items, thus

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leaving the sole article of food to be paid for from the wool. The summering then being fifty cents and the wintering eighty-four, unless the sale of the wool amounts to one dollar and thirty-four cents to each sheep, the grower is parting with it for a less sum than it costs him to produce it.

Our farmers have been aware that the prices of wool of late years have not paid the cost of its production, and that if devoted to dairying or the raising of grain, their lands would yield a much greater income, than to be stocked with sheep. But being already skilled in sheep-husbandry, with portions of their farms better adapted for this than any other use, with flocks already on their hands and all the facilities provided for their management, rather than incur the expense of a change, they have clung to their sheep year after year, with the expectation that a turn in the market would certainly take place, which would render the business more lucrative. A slight revival in the price of wool at this present time is hailed as the harbinger of better times and excites strong hopes that a brighter day for their interests is about dawning.

150. *Washing and shearing.*—A few other points remain to be noticed, to complete this account of our sheep management. The operations of washing and shearing are now performed later in the season than formerly. Sheep are washed early in June. As this work is so much quicker and better performed when the wool is saturated with moisture, it is commonly done immediately upon the close of a rainy spell of weather, ere the fleece has become dry. Even thus the matted dead-ends of the wool do not become so soaked as to enable them to be cleansed to the extent that is desirable; and to do this work in the best manner, it is essential that the flock when dripping with wet should be closely huddled together in a yard or stable, for the space of four or six hours before it is washed, as thus the warmth and perspiration from their bodies penetrates and softens the dead ends of the wool and enables the dirt to be much more effectually removed from them. Our clean pebble-bedded, running streams afford fine advantages for sheep-washing, such as many districts do not possess. It was formerly thought essential that spirituous liquors should be furnished to the men employed in this work, to prevent their taking cold, and in the early days of the temperance reform, many on taking the pledge reserved the privilege of drinking at these times; but it is now well established that this is unnecessary, and the custom is abolished.

Shearing is generally done ten or fourteen days after washing, the sheep being kept, in the interim, in a clean pasture where neither dust nor mud will be liable to find its way into the wool. The buyers are desirous that this operation should be done as soon after washing as the fleece becomes dry. The growers on the other hand maintain, that it

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should be deferred until the yolk has again started out somewhat into the wool, that if cut before this, the wool will be unduly light in its weight and less valuable from being dry and harsh. The shearing of twenty sheep is currently regarded as a day's work, though expert hands easily exceed this number. Whether few or many are sheared in a day it is a most essential point to have this work done well and carefully. The wool should be cut off as close as possible without anywhere wounding the sheep. A sheep that is badly wounded in shearing is never so valuable afterwards, as it is only thin coarse wool and hairs that grow in the cicatrix formed by the healing of each wound. Humanity, therefore, as well as the proprietor's interest demands that a careless bungler should never be employed in this operation.

151. *Value of a sheep as respects its age.*—It was formerly thought that a sheep after it was eight or nine years old was no longer profitable, and that like an old horse it ought then to be turned off. This practice, however, is no longer pursued, as ewes in particular, after they have attained or passed that age, are believed to produce larger and thriftier lambs than when younger. The fleece, however, is then less valuable. In this respect, the second clip is about the best that is ever produced by a sheep, and after it is five years old the quality of the wool perceptibly declines, so that when graded it will commonly be placed one sort lower than it had previously stood. The wool also becomes more harsh and wiry as age advances, but it continues to be of fair character up to the age of ten or twelve years, after which it is of little value. And about this period of its life, the sheep has become so decrepid that it is commonly disposed of to the pelt-mongers at the approach of winter for the value of its hide and tallow. Ewes, however, still continue to be valuable for raising lambs, and are hence more rarely parted with. Instances are known in which they have attained fifteen and sixteen years ere they sank under the infirmities of age.

152. *Rearing of lambs.*—The old custom of having the lambs yeaned early in April caused much extra labor and great losses, though it produced more thrifty and stout individuals than those which we now rear. Then, upon every stormy night, in lambing-time, our more careful flock-managers made it a point to be up the whole night through, visiting the fold frequently with a lantern, and as soon as a lamb was dropped, bring it into the house, get some warm milk down it, and keep it within doors until the storm was over and it became dry and vigorous enough to withstand the weather.

From the 20th of April to the 10th of May is now the time when in most of our flocks the lambs commence being yeaned. The season is

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then commonly so far advanced that few perish in consequence of its rigors. When due care is bestowed, about ninety lambs are now raised from every hundred ewes—an increase which was unlooked for formerly. But they are so much more dwarfish and tender that they require extra shelter and keeping to carry them successfully through the first winter.

About the middle of September they are weaned, by being placed in a field apart from the ewes. This is necessary for the two-fold object of enabling the ewes to recruit in flesh and strength ere the coming on of winter, and to accustom the lambs wholly to grass, that they may more safely be transferred to hay subsequently. The recently mowed meadow in which the grass has now started up fresh and tender is the spot on most farms to which the lambs are taken. A sore mouth often attacks them on this change. Their lips become much swollen and of a high red color, and crack open. This inflammation is evidently caused by the friction of the grass, this being so much more rough, rigid and irritating than the teats of the ewe from which their nourishment had previously been chiefly derived. An ointment made of lard three parts, tar one part, and sulphur one part, mixed together, and gently rubbed on to the lips, cures them almost invariably with but one application.

153. Casualties. *Sheep destroyed by wolves.*—The better to appreciate the advantages which we at present enjoy, it is useful to recur to some of the steps by which our country has been subdued from its wilderness state and adapted for the employments of civilized life.

In the early settlement of this county, as in that of all the other parts of this country, great annoyance in the keeping of sheep was experienced from the wolves. It appears to have been a custom sanctioned by law, at an early day, for each town or county to make its own regulations for expediting the destruction of these and other noxious animals; and we meet with the following entry in the records of our board of supervisors, September, 1786: "Voted, that £150 Tax be laid on the County to defray the county expenses, such as Wolf Tax, &c. Excepting the District of Crown Point, which is to be nothing laid on as a County Tax." But these local provisions, it would appear, proving inadequate for that universal destruction of these animals in the settled parts of the State which was felt to be necessary, the Legislature, April 3d, 1790, required by statute that there should be paid, "For every grown wolf or panther, killed in the counties of Montgomery or Washington, twenty shillings, and for every wolf or panther under the age of one year, ten shillings,"—and a bounty threefold greater was by the

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same act given in all the counties east and south of these. To obtain this bounty it was necessary that the unskinned head of the animal should be taken to a justice of the peace and oath made that it had been killed within the county. The justice was hereupon required without charge to furnish a certificate of the fact, and cut off the ears of the animal to guard against its being similarly used a second time. This certificate on being audited by the board of supervisors, was paid by the county treasurer. The bounty given by statute, however, was deemed inadequate in this county, and it was therefore raised to five dollars, as appears from the following record, October 5, 1790: "It was further Declared and Resolved that after this meeting there be allowed and paid by the Treasurer of this county the sum of two pounds for every grown Wolf or Painter's pate, and the sum of one pound for every Wolf or Painter under one year old, including the bounty granted by the State."

How numerous these animals then were, and what was the public cost of exterminating them we have no means of ascertaining, the supervisors many years ago having most unwisely ordered the obsolete papers that had accumulated in the office of their clerk to be destroyed. That wolves at least were abundant in the oldest settled towns of the county, so late as the year 1795, is indicated by the fact that in that year the late William Fitch, of Salem, in going on horseback one dark night, upon the Hebron road, from Fitch's Point, was closely beset by an immense pack of these animals in full bay, and only escaped with his life by putting his horse to its utmost speed, and swinging from side to side a lighted torch which he carried, this repelling them from the very stirrup-irons of his saddle, until he reached the first house, a mile distant, from which he deemed it imprudent to venture until daylight. The bounties above noticed, however, appear to have produced a rapid destruction of these pests. The Kingsbury swamp was one of their most noted haunts, and here they remained till some time after they had been extirpated from all the contiguous district. Finally, in 1801, the inhabitants of that vicinity, unwilling to submit longer to their depredations, rallied on a given day, surrounded the swamp, and beating through it, killed eleven in number. This was the last wolf hunt in the county, and since that day, little annoyance from this cause has been experienced.

These animals, however, are not wholly exterminated from the mountain districts on either side of us, and sometimes a straggler comes down from thence into the midst of the settled parts of the county. Such an instance occurred the latter part of February, 1849, when a

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wolf was discovered in the town of Greenwich, and made his way thence across the towns of Jackson and Salem into Sandgate, Vt., killing from one to a half dozen sheep out of a number of flocks in his route; and notwithstanding the zealous pursuit that was made in search of him by whole neighborhoods, he escaped unslain.

154. *Foxes.*—Long after the wolf was exterminated, another of the native animals of this country, the fox, remained everywhere common, and by destroying lambs, was a source of much annoyance. Indeed, on the more secluded farms, and contiguous to ranges of woodland, losses from this cause are yearly experienced in all sections of the county at the present day; and in Putnam, and the wild district in that direction, it is no trifling pest.

155. *Dogs.*—In addition to the wild animals now mentioned, one of our domestic animals, the dog, is sometimes the cause of losses in our flocks of sheep. This was much more frequently the case at an earlier day, when two, three or more of these were kept in almost every household, being then more necessary and useful for driving from its precincts the denizens of the surrounding forest. When thus habituated to the chase, they were a much more ferocious race than that which exists among us at present; and many of them had such a vitiated education that they were unable to discriminate between a wolf and a sheep sufficiently to comprehend why it was right to kill the one and wrong to kill the other. When costly, fine-wooled sheep became favorites in the county, popular sentiment decreed that a dog that would kill a sheep, should no longer live here; and among all the laws of our statute book, none has been more rigidly and uncompromisingly enforced than that which provides for the destruction of dogs that are addicted to this habit. If the guilt of the culprit is made plain, he at once suffers death, commonly by the hand of his owner, or if he be dilatory in the matter, by the hands of some of his neighbors; and any sentimental moralist who should maintain among us that capital punishment ought not to be inflicted in such cases, would himself be in some danger of receiving the same penalty. Numerous as dogs are with us, it is a matter of some surprise that they have become so inoffensive towards sheep. Not oftener, probably, than once in a half dozen years, does an authenticated instance now occur in any neighborhood, of sheep being slain by dogs. A dog that once does an act of this kind, repeats it until he is detected. And the sagacity that these brutes sometimes display, to screen themselves from suspicion, is truly wonderful. It is seldom that they molest the sheep of their own immediate neighborhood; but, straying off to the distance of two or three miles, they there

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gratify their vicious propensity, and return home ere daylight. It is thus often difficult, for a time, to detect the real culprits.

DISEASES OF SHEEP.

156. *Scab.*—We proceed next to adduce such facts with regard to the diseases with which sheep in this district are affected, as are within our knowledge. These diseases are chiefly cutaneous affections and maladies which result from the attacks of insects. Of the former, one of the most common is the Scab, as it is termed. This has prevailed much more with the Vermont flocks than it has with us. It is a contagious disease, analogous to the itch, and is the worst when the fleece is most heavy, namely, in the spring and fore part of summer. To appease its torment the sheep bites and scratches and rubs itself, starting out the wool; and if not attended to, it eventually dies, the disease in the meantime spreading through the whole flock. The skin is inflamed and rough, and is covered here and there with pimples which discharge a fluid, and become crusted over with a scab. It is cured by thorough washings with decoction of tobacco.

157. *Johnswort poison.*—It is a common opinion that the green and growing leaves and stalks of Johnswort (*Hypericum perforatum*, Linn.) a weed which fortunately is much less common in our fields now, than it was fifteen years ago, by their acridity produce a soreness and inflammation of the noses of sheep in consequence of rubbing against them. But some experienced observers say they have never seen such an effect, except perhaps in lambs. The most serious injury of this poisonous weed is that which it produces upon the skin of the body. When sheep in spring are turned into a field where the dry dead stalks of the last year's growth are still standing the seeds often get into the wool and work down through it to the skin, there producing sores similar to those of the scab. These should be dressed with an ointment made of lard mixed with about one-sixth part of tar. Where sheep are beginning to be poisoned by running in Johnswort pastures, the wool of each should be parted along the back and a streak of this ointment rubbed on the whole length. It will then work down over the body and preserve the sheep from becoming affected by the poison.

158. *Sun-burnt backs.*—Among other objections to the finest wooled, delicate, Saxony sheep, that were brought into the country twenty-five years ago, was this—their lambs when first yeaned had such thin wool and a skin so tender that they were unable to withstand the rays of the sun, even in this high latitude. Within a few days after birth if it was clear weather, their ears would become enormously swollen and red, hanging down by the sides of their heads, blistered as it were, and

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translucent; and the whole back would become highly inflamed and sore, scabbing over and peeling off, bringing the wool with it and leaving the surface bare. Greasing the backs with lard was the practice to mitigate and cure this; but the better plan was to prevent it, which was effected by blanketing the lambs. A little experience enabled one readily to recognise these peculiar thin wools and tender skins as soon as they were born, and it was the practice of some, into whose flocks they became introduced, to sew on to them a piece of woolen or cotton cloth so securely that it would remain about a fortnight, by which time the back would become sufficiently tough to withstand the rays of the sun. Full grown thin-wooled Saxons after shearing are also liable to have their backs become burnt and excoriated by the sun in a similar manner; and to prevent this it is necessary that they should be anointed in the same mode at shearing time.

169. *The sheep-tick.*—By some popular writers this insect has been supposed to be a true tick, of the old genus Acarus, and we hence meet with it in books, referred to as being the *Acarus reduvius* of naturalists, a tick which infests cattle and dogs. It is probable that by the common name of this insect and by the circumstance that it does not possess wings, these writers have been misled to refer it to a place very far from where it really belongs. This mistake requires correction. The true ticks and mites have eight legs, like the spiders, with which they are accordingly classed in systematic works. This insect, however, has six legs only, and consequently belongs among the true insects.

At the close of the two-winged flies which constitute the order DIPTERA, is placed by naturalists, a small group named HIPPOBOSCIDÆ, the subjects of which constitute a connecting link between the true insects and the spiders. They have such a striking resemblance to spiders, that they are known in some countries by the name of "spider-flies." They differ from all other flies, notably, in some points of their organization, and in their habits. Though furnished with wings, it is seldom if ever, that they use them, for they do not fly abroad like the other insects of this order, but are parasites, passing their lives upon particular quadrupeds and birds. By means of the forked claws with which their feet are furnished, they are able to cling securely to the hair or feathers of these animals, and to run about among them with rapidity, and also to fasten themselves to the skin, piercing it with a sucker, through which they receive their nourishment.

Several of these flies are found upon the animals belonging to this continent. If an owl is killed in mid-winter, there will sometimes be discovered wandering about upon its feathers, or in the vicinity where its body is laid, a fly, which is the more observed from its being abroad

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at this inclement season of the year. It is of a lurid-yellow color, the legs and under side of its body paler, and its wings of a slight smoky tinge expanding to the width of eighty-five hundredths of an inch when spread apart. It seems to differ in no very obvious particular from the *Ornithomyia avicularia* of Europe. Whoever has observed one of these flies, will have been struck with the resemblance which exists between them and the well-known sheep-tick, except that they are furnished with wings.

A larger species of these spider-flies, the *Hippobosca Equi*, of Linneus, is of a yellow color, with wings of a slightly russet tinge. It infests the horse; but I am not aware that it has ever been discovered on this side of the Atlantic.

Remarkable in this family, on account of its not possessing any wings, is the sheep-ticks, *Melophagus Ovinus*. It is less than a quarter of an inch long, and varies in the shade of its color, from rusty brown, to dull yellow, the hooks of its feet being black. Its body and legs are studded with short bristle-like hairs of a blackish color. In addition to its being wingless, another remarkable anomaly is presented to us in the history of this insect, as well as that of other members of this family. It does not undergo those several changes of form which take place in other insects. It has no larva or maggot state. It is a pupa, and not an egg that is deposited by the parent, and the perfectly formed insect comes directly from this pupa. It resembles a smooth, glossy seed, of a chesnut-brown color, and a regular oval form, slightly flattened, and is scarcely fifteen hundredths of an inch. At the head end, a slight depression is observable, in which are two punctured indentations. These pupæ are always observed scattered around in the fleece, when the sheep are being sheared.

Ticks multiply on poor sheep, like lice on a sickly child or cow. They find a secure abode among the long dense wool of this animal, in which they ramble about with agility. They are always found in plenty at shearing-time. Many of them remain upon the fleece when it is carried to the store-room, and the shearer often finds one or more of them upon his clothes, or in his hair, sometimes several days afterwards, where, pressed by hunger, they in some instances attempt to pierce and obtain nourishment from his skin. Others remain upon the sheep after it is sheared, but by the removal of the fleece, their haunts are so broken up, that they forsake their old abode for the longer wool, which they now find upon the lambs. Hence, two or three days after shearing, the lambs will be found to be overrun with ticks, to their excessive annoyance, whilst the old sheep have became nearly or quite free from them. This affords the most convenient opportunity for destroying these parasites.

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The lambs should nowbe got up, and be dipped in or washed with a decoction of tobacco—a cheap, inferior kind of which is on sale in most of our stores for this purpose. Some are in the habit of washing their entire flock in this decoction, on the days of shearing, and this is a more effectual, but also a more laborious practice. This narcotic at once destroys the ticks, and has never been observed to nauseate the sheep, in the least degree.

160. *Grub in the head.*—This is an affection which is caused by the larva or maggot of an insect belonging to the family of gad-flies (ŒSTRIDÆ) which is another group pertaining to the same order of two-winged flies (DIPTERA.) The Œstrides resemble bees more than flies, in some respects, being large insects covered with hairs which often form bright colored bands. They are among the most singular and anomalous insects that are known. All the other two-winged flies possess a trunk or proboscis through which they imbibe their nourishment. But the Œstrides are not only destitute of this trunk, but several of them have not the slightest vestige of a mouth—no opening whatever in the face by which to take in sustenance. It is in their larva state only that they receive nutriment; and in this state each species lives within and draws its nourishment from some particular quadruped of the herbivorous kind, none of them occurring upon the carnivorous. These larvæ have three kinds of domicils in the animals which they infest. Some are *cutaneous*, living in tumors in the skin of the ox, the deer, the rabbit, &c. Others are *gastric*, subsisting in the stomach of the horse. Others are *cervical*, living in the frontal sinuses of the sheep and the reindeer. No one can contemplate the habits of these insects without being overwhelmed with surprise, they are so truly wonderful. In each instance the parent fly selects for its eggs a nest appropriate for the wants of the young insects that are to hatch from them. And as is well observed by the celebrated French entomologist, Macquart, in this selection is shown a foresight and sometimes a chain of reasoning which excites our profound admiration, not for the insect, for to it it is impossible to attribute such forethought, but for that Supreme Intelligence by which it is prompted in its proceedings. How, for instance, can it be admitted that the bot-fly of the horse, an hour or two after it is hatched from the earth, knows all that it is doing, when after hovering some time in the air by the side of its victim, it deposits an egg upon his shoulder or else upon the inner side of his legs. Surely its own intelligence cannot inform it that that egg ought to be placed there so that the tongue of the horse in licking that spot will take off the young larva and draw it into his mouth and swallow it thence into his stomach, where its life must be passed.

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As this group of insects is so deeply interesting, particularly to the farmer, some account of those species which most annoy our domestic animals may be given in this place.

The bot-fly of the horse being regarded as the type on which Linnæus founded his genus *Œstrus*, that name is retained for it by the latest naturalists, instead of the name *Gasterophilus* proposed by Dr. Leach. The most common species, *Œstrus equi*, Linn., is from a half to three-fourths of an inch long. Several specimens before me exhibit considerable differences in the details of their coloring. The thorax or middle segment of the body is black, the head and abdomen varied with brown, dull yellow and sometimes black, which last is the prevalent color of the exserted tip of the female abdomen. The body is covered with yellow hairs. But the most constant character by which to distinguish this species is the markings upon its wings, these being transparent, with a brown, smoky-like band across the middle and two spots of the same color at the tip. The pupa, as it has occurred to my notice, is half an inch long and a quarter of an inch broad, nearly oval but somewhat smaller anteriorly. It is of a black color, encircled with rows of short sharp spines or thorn-like points directed backwards, there being one such row upon each segment. On the anterior end are two little processes like horns. I have sometimes met with this pupa in the dung of the horse, the larva in these instances probably having been so far matured towards its pupa state when it was voided from the animal that it was unable to crawl into the ground as it usually does.

The *Œstrus nasalis*, Linn., is the name applied by the latest authorities to the species which has been current in books under the name of *veterinus*. This is of nearly the same size with the preceding, and has the head yellow, the remainder of the body being black. Hairs orange yellow; those of the abdomen whitish except on the third segment, where they are black; wings, hyaline. This and the preceding are the only species of bot-fly that infest the horse, that I have met with in this country, though it is not improbable that others exist. There is perhaps no part of the science of entomology where so great confusion has prevailed in the names and descriptions of the species as here, and the authorities are so discordant that it is difficult to determine which names are to be sanctioned as the correct ones.

The *Hypoderma Bovis*, Linn., or gad fly which produces the warbles on the backs of cattle, is of a size corresponding with that of the common bot-fly of the horse. It is of a black color and clothed with yellowish-white hairs, except on the third segment of the abdomen, where they are black. The wings have a brownish tinge.

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The sheep gad-fly, *Cephalemyia Ovis*, Linn., is somewhat smaller than the species above noticed. Its thorax is grayish and is covered with little black tubercles, each of which bears a hair. The abdomen is white and in particular reflections of the light exhibits irregular black spots. The legs are yellow and the wings hyaline. This fly commonly lurks about the vicinity of woods, in the months of June and July. According to the accounts of it that we meet with in authors, it aims to get its eggs within the nostril of the sheep, and for this purpose darts upon it with the quickness of lightning, depositing an egg in the act. The warmth and moisture of the part speedily hatch this egg, and the little worm that comes from it crawls up the nostril until it reaches some of the cavities connected with the nose. It is said that this worm occasions great irritation as it crawls upwards, causing the poor animal to gallop furiously about, snorting violently, as if almost maddened by the annoyance. The worm commonly takes up its abode in the frontal sinuses. These are two large shallow cavities in the forehead, one on each side, directly above the eyes and the root of the nose. It here fastens itself, by means of two hooks with which it is provided, to the skin which lines these cavities, and there remains until April or May in the following year, the sheep experiencing no further annoyance from it after it attaches itself. Being at length fully grown, it loosens itself from its hold upon the skin and crawls out the same way by which it entered, again giving much annoyance to the animal, which makes most violent efforts to sneeze it out. Dropping to the ground, it burrows beneath the surface, and becomes an oval, motionless pupa, in which state it remains six or eight weeks, when, breaking asunder its its shell, it comes forth a perfect fly. Being destitute of a mouth it takes no food, and only exists a short time, depositing its eggs for another generation being its sole employment.

I am informed by my neighbor, John McDonald, that some years since a number of his sheep were observed in the month of April to be affected with a discharge of mucus from the nose. They lost their appetite, pined away and became quite emaciated, and about a half dozen of them died. On opening the heads of these, from one to six grubs were found in the frontal sinuses of each. I have never examined the heads of deceased sheep to find the larva of this insect, but have, in some instances, observed it dead in the mucus that oozed from the nostrils of the sheep, a day or two after it had died. And from this fact I infer that like other parasites, it leaves the body on which it has preyed when life has become extinct, and those larvæ that are suffi-

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ciently matured, thereupon crawl into the ground and complete their transformations, whilst those that are immature perish.

That this fly is a most annoying pest there can be little doubt. A sheep will sometimes be observed to suddenly stamp and kick up both with its fore and its hind feet, as if stung by some insect, and will thereupon suddenly dart off at full speed towards another part of the field, as if to escape from its tormentor. But whether this is in consequence of its being assailed by the gad-fly is not certain. But to avoid the assaults of this insect the whole flock is often seen crowded together upon some bare, dusty or sandy spot, in the pasture, with their heads turned inwards towards the center of the group and held close down to the ground, one and another continually stamping with their feet as if to frighten away their enemy.

It is obvious that human instrumentality can be of little avail in protecting the sheep from this scourge. The inner side of the nostril being a secreting surface, it is impossible to coat it with tar or any other substance to shield it and prevent its being a suitable nidus for the eggs of the gad-fly. And to have the sod broken in some dry, dusty part of the pasture, and thus aid the animal in those efforts to which its instinct prompts it to resort seems about all that can be done for it.

161. *Maggots.*—The most deplorable casualties to which this innocent and valuable animal is subject, it may truly be said that it experiences from its insect enemies. In addition to the injuries which we have already considered, another still more calamitous and horrible remains to be treated of—that of being infested and consumed by maggots. These disgusting vermin, which rarely riot upon other animals until after life is extinct, not unfrequently make their assault upon this defenceless creature, as it were, before their time. Whilst it is yet in full health and vigor, they form a lodgment upon it, and rapidly multiplying, overrun its body, literally devouring it alive.

These maggots are the larvæ of several species of flies. That which is the most common one among them, is named by naturalists *Lucilia Cæsar.* This is about the same size with the common house fly, but of a brilliant brassy-green or blue-green color, and the legs black. It may always be observed abundant upon the bodies of dead animals in the fields in the summer season. And associated with it in such situations, is another species, *Lucilia Cadaverina*, which scarcely differs from it, except that it is a third smaller, with wings, exhibiting a slight degree of duskiness.

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Another species is the blue-bottle-fly, *Calliphora Vomitoria*, Linn. This is much larger than either of the preceding, and is often seen buzzing about in situations where fresh meat is exposed. Its thorax is of a black or blue-black color, and the abdomen or hind-body deep shining blue. And a second species of the same genus, named *Fulvibarbis* by Robineau Desvoidy, closely resembles it, but is readily distinguished by the color of the bristle-like hairs at the base of the head below the eyes, which are here of an orange yellow instead of a black color.

These are the most common and best known European species of these carrion-maggot flies, but there are quite a number of others very closely allied to them, yet regarded as distinct by the naturalists of the present day. Our American species seem to differ scarcely, if at all, from those of Europe. A careful study, however, and comparison of foreign specimens with those of our own country, is necessary to determine accurately the number of our species, and whether they are really identical with those of the old world.

One of the most interesting traits in the habits of all the maggot-flies, is the unerring accuracy which the parent fly displays in selecting the appropriate nest for her offspring. Thus the egg of some genera are always placed upon decaying animal matter; others upon decaying vegetables, particularly mushrooms; and others still upon the dung of the cow-yard; the parent in each case choosing out the spot where her young will find that kind of nourishment on which alone it can subsist. From the eggs thus deposited, and which are commonly called fly-blows, the larvæ hatch. These are denominated maggots, in common parlance; and they accelerate the decomposition of the substances on which they live, so rapidly, that they seem to have been designed by the Author of Nature expressly for consuming such substances, and thus preventing them from tainting and poisoning the atmosphere by their effluvia, to the extent that they would be liable to do if left to decay gradually, and exhale all the gases that would be formed by their decomposition. When the maggots have arrived to maturity, they leave the substance on which they have been living, and crawl slightly into the ground, where they change into pupa of a chestnut brown or black color, and of a form resembling that of a barrel. Here in the earth they lie dormant during the winter, and on the return of warm weather the perfectly formed and fully grown flies hatch from them.

It is the species of the genera *Lucilia* and *Calliphora* more particularly whose larvæ subsist upon cadaverous matter; whilst those of the genus *Musca* live in dung-hills. In this last situation is cradled during its infancy that best known of all insects, our common house-fly, which Dr. Harris supposes may be distinct from the analogous species of Eu-

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rope (*Musca domestica*) and which he therefore names *Musca harpyia*. It is truly a harpy, appearing in swarms in the hottest period of the year, particularly in dwellings where the utmost neatness is not observed; impudently obtruding without invitation, and making itself the first seated guest at the dinner table, and ere grace is said, freely regaling itself from every dish upon the board. And the pertinacity with which a particular individual will often persist in travelling about our faces, or other parts of our bodies which are not covered with clothing, in order to drink up the perspiration which exudes from the skin, is often most annoying. Another species, also bred in the dung-hill, the *Stomoxys Calcitrans*, Linn., though it so exactly resembles the common house-fly, as to be popularly regarded as identical with it, is too voracious to thus content itself with the sanies that perspires from our bodies, but sucks the very blood of both man and beast, inflicting in this act a piercing bite that is most tormenting, particularly to the horse.

Though nature has assigned decaying animal matter to the Lucilian and Calliphorian flies as the domain in which their young are to be reared, as already intimated, they sometimes overleap their appropriate bounds and deposit their eggs in the ulcers of living animals, thereby causing these to swarm with maggots. And of all animals, the sheep, inoffensive and defenceless, is the greatest sufferer in this particular; and this is the case, alas, too commonly in consequence of the negligence and inattention of its inhuman owner. In warm weather, where ever upon a sheep the skin is fretted and abraded so that moisture exudes from it and a running sore is formed, it is sure to become the repository of the eggs of these flies. The following may be specified as the common causes of such sores and the consequent foundation of this malady.

1st. Bucks when kept together in the same field (as they necessarily are in most instances) become addicted to the habit of bunting each other; and an instance is related to me in which a valuable animal got his neck broken whilst indulging in this pastime as many are inclined to regard it. Frequently, hereby, blood or sanious matter is made to start out, moistening the wool around the roots of the horns. This wet wool becomes fly-blowed and the maggots thus obtain a lodgment here. Esq. Livingston who has had forty years experience, generally with a large flock, informs me that during all that time this casualty among his bucks has been the only thing of the nature of a disease, for which he has had occasion to resort to a medicinal application.

2d. Instances occur, though they are very rare, in which one of the horns at the end of its first volution grows almost in contact with the head, hereby pressing and matting together the wool between it and the

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skin, causing it to become foul and to remain wet for sometime after a drenching rain. Thus the spot becomes adapted for the purposes of the fly, which thereupon makes it the repository of its eggs.

3d. When tagging the sheep is neglected, at time of turning them to grass, the filthiness that accumulates around the tail becomes such a source of irritation that some abrasion of the skin at length results from it and the sore is speedily discovered by the fly and appropriated to its use. So sure is this to take place among some of the flock that we have no sheep owners that I am aware of who neglect this most important operation.

4th. Maggots are an invariable sequel and the common cause of death in the foot-rot, as will be more particularly related under that disease.

In fine, whatever produces any sore from which moisture exudes is liable to result in this affection. Nay, one instance is related in which it was supposed to have originated without any abrasion of the skin. Some years since, Ebenezer McAllister, late of Salem, discovered that a number of his flock were infested with maggots. It was in the latter part of the season, just after a protracted period of rainy weather, and as the sheep had all been sound to appearance, it was supposed that the wool in consequence of having been so long wet, had become adapted for receiving the fly-blows. At all events there could only have been one or two of the sheep with slight and unobserved wounds in which these eggs were deposited in the first instance and the fleeces of the others being saturated with moisture the maggots freely crawled from one sheep to another when they were lying or standing in contact, so as to become extensively spread through the flock.

With regard to the treatment of this affection a few words will suffice. Removing the wool from around the ulcerated surface so that it shall no longer afford a covert for the worms, and pouring spirits of turpentine (oil of pine,) freely into the sore is the practice here universally resorted to. A few applications are effectual, in all cases where the malady is seasonably discovered. Where bucks are running together in warm weather their heads should be frequently examined and if there is any soreness or bloodiness about the base of the horns, spirits of turpentine should be applied. So watchful in this respect was the late Isaac Bishop that he made it a practice during warm weather to get his bucks up regularly once in every month and apply this medicine around the horns of all, indiscriminately, whether they were thus affected or not. Wherever this pungent oil penetrates, if maggots are there lurking, it instantly starts them out in evident agony—they hurry forth in-

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to the ends of the wool, many dropping themselves to the ground, and others exposing themselves so that they are readily brushed from the fleece.

162. *Foot-rot.—How introduced into this district.*—The foot-rot is altogether the most severe and the most dreaded of any disease prevalent among the flocks of this district. Though it is now so common and wide-spread, it was unknown upon this continent, until it was introduced by the Saxon sheep. All the many cases of it that now exist in this section of the country, are believed to have been derived from a single diseased sheep, the history of which is therefore too important to be here omitted.

In the Autumn of 1827, Judge Campbell obtained a buck from the newly-arrived flock of Mr. Grove. It was a fine animal, and cost the purchaser a hundred dollars. A slight lameness was observed in one of its feet at the time of its purchase. This, Mr. Grove assured Esq, Campbell, was caused by a sliver or stub which had got into the foot. That Mr. Grove supposed the animal was wholly free from the foot-rot, no one who knew him, will doubt; and yet, it is difficult to conceive how a person so experienced in this disease, as Mr. Grove had been, came to be mistaken upon a point susceptible of being ascertained with such readiness and certainty.

The buck was turned with Esq. Campbell's flock, and ere long other sheep began to show the same lameness, and on the coming on of warm weather, the following spring, it fully developed its character, and raged with a virulence similar to the plague or yellow-fever when introduced into a populous city. Profoundly ignorant as our community was of the disease, and its mode of treatment, it advanced, unchecked, until it had pervaded the whole flock, and destroyed a number of its members. A youth living with Esq. Campbell at this time, going bare-footed into the field got some of the virus into a slight scratch that was upon his foot. It produced a most painful and malignant ulceration in the wound, and was at length cured by a resort to the same caustic application that was used upon the sheep.

Other flocks in the neighborhood, from being drove to the same pen to be washed, where Esq. Campbell's flock had been, and in other analogous ways, received the disease, and for a time it excited such consternation in Quassacook, and its vicinity, that the proprietors of sound flocks, scarcely dared to venture on to the public highway with their sheep, lest they should acquire the contagion. None of the other sheep obtained from Mr. Grove, communicated the disease to the flocks into which they were taken. Though it was known to be among his flock at the same time, he was careful to dispose of none but sound in-

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dividuals. Judge Campbell commenced a suit at law against him for he damages he had sustained. The ablest counsel were employed upon both sides. Our whole community was excited, and took a deep interest in the subject. But the parties were men of too much discretion and good sense, to become involved in a course of litigation, from which both would probably be pecuniary sufferers in the end. The matter was therefore compromised ere it came to trial, Esq. Campbell receiving one hundred and fifty dollars from the defendant, and withdrawing his suit.

163. *The disease little cared about by some.*—From the single case above recited, the foot-rot has spread extensively through this district, and has been common since that time, though there are some neighborhoods to which it has never been communicated. Some of our farmers suffer it to linger for years in their flocks, and do not regard it as by any means, so serious a calamity as it is currently deemed to be. When at any time their sheep become badly affected by it, they resort temporarily to medication, which checks it; but they do not feel it to be worth their while to persevere in that medication until the disease is entirely eradicated. The owners of sound flocks, however, are always sedulous in guarding them from any communication with this disease. Little of it exists at the present time in those of our towns where the greatest numbers of sheep are owned. It is much more common to the east of us, in Vermont; and several who in former years were accustomed to hire pasturage upon the mountain-sides there, have abandoned the practice, in consequence of finding that their flocks were so liable to contract this disease when sent hither.

164. *Its predisposing cause.*—That this a contagious disease, communicated by contact with the matter that has discharged from the sores of affected sheep, there can be no doubt; and it is surprising that there has been a disagreement among writers upon this subject. The opinion advanced by Mr. Dick, in a communication to the Edinburgh Quarterly Journal of Agriculture, and copied without note or comment, into some of our popular treatises on sheep, that the foot-rot proceeds from sand and dirt, which insinuates itself between the crust and sole of the hoof, until it reaches the quick, and there excites the inflammation and ulceration, which constitutes this disease, we cannot but regard as purely hypothetical. Why did not the sand and dirt of the American continent sometimes insinuate itself into the soles of the native sheep, or the Merinos, which were so extensively introduced, fifteen years anterior to the arrival of the Saxons? Assuredly, if this disease is produced by the causes assigned by Mr. Dick, it would have been as

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common in this country before the Saxon sheep were imported, as it has since been. But it is unnecessary to enter upon a discussion of this topic, inasmuch as there is but one opinion prevailing in this country respecting it. Facts in abundance might be adduced to show that this prevailing opinion is correct.

The predisposing, that is, the essential cause of this disease, is a virus, or poisonous matter, which is generated in, and issues from the sores upon the feet of diseased sheep, which virus, by coming in contact with the feet of sound sheep communicates the same disease to them. It is therefore a disease of identically the same class with the itch, the small-pox, &c., in the human race, the kine-pox in the cow, and the "grease," in the horse. In the foot-rot of sheep, it is the common, and no doubt the correct opinion, that this virus is communicated not immediately from the feet of the diseased to those of the sound sheep, but is discharged upon the grass, haulm, stones, &c., of the sheep-walks, from whence it comes in contact with the feet of sound sheep. How long this virus, after it is discharged from the sores in which it has been generated, will retain its energy, is an important question, upon which we possess no authentic information. It would seem, that exposed as it is to the atmosphere, to the light and heat of the sun, the rains and the night dews, it would be soon decomposed and rendered inert. But no one deems it safe to turn his sheep into a field where diseased sheep have been, the same season; and some, are even of the opinion, that the frosts of winter do not destroy the taint, and that there is therefore some risk in pasturing sheep where a disorded flock has had its abode the preceding summer.

165. *Its exciting causes.*—It is in the summer season that this disease mostly affects the sheep. During cold weather, except a slight degree of lameness, it commonly discommodes them but little. As warm weather advances, the lameness increases, and the ulceration and discharge of matter then becomes more active.

The foot-rot is most inveterate among flocks that are pastured upon low, wet grounds. Hence it prevails to a much more considerable extent upon the clay lands upon the west side of this county, and is there more obstinate and less readily cured than upon the gravel lands on the east side of the county. And in Easton, large and valuable flocks have sometimes been so badly affected, that their proprietors have been induced to sell them out entirely, and remain a year or more without any sheep, regarding this as the only course by which they could hope to obliterate the virus of this disease from their premises.

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In dry summers, among flocks pastured upon mountain lands, this disease does not occasion much annoyance. But even here, it will spread and rage in a virulent manner, in damp, hot seasons. It consequently affects our flocks, much more seriously in some years than it does in others, warmth and moisture being the circumstances that have been observed as contributing to promote it in a notable manner.

166. *Its symptoms.*—Dr. James Rice, of Fort Ann, in whose flock the foot-rot has prevailed of late years in a slight degree, informs me that it is not a constitutional, but purely a local disease, in the medical sense of these terms. In other words, it is not attended with any fever, loss of appetite, or other disturbance of the system at large—that except a slight preternatural warmth, perhaps, in the leg, on the access of the disease, all its symptoms are confined to the foot alone. One foot only is commonly affected at the first, and it is rare that all the feet are diseased even in the severest and fatal cases.

The disease consists in an inflammation and ulceration in the sole of the foot, at the junction of the hoof with the soft parts, eating like a cancer and destroying the connection of the hoof with the foot. It commences upon the posterior or heel side of the foot and works forward towards the toe, the heel portion of the hoof becoming entirely sundered from the soft parts, so that it may be readily raised up, whilst the attachment anteriorly still remains sound; but eventually the whole hoof becomes severed and drops off. The ulceration is of a highly malignant character; fungous granulations, popularly called "proud flesh," shoot up, and it is what is commonly termed "an angry-looking sore." The matter which is discharged from it has a peculiar and most offensive smell, which, in doctoring this disease, is imparted to the fingers and remains upon them for two or three days notwithstanding the most thorough washing. This peculiar fetor is one of the surest diagnostic marks of the disease. A person who has once become acquainted with it will readily determine thereafter whether lameness in a sheep is caused by foot-rot by the sense of smell; nor does the organ of this sense require to be very near the affected member to perceive this odor, if it is present.

167. *Its termination.*—This disease is probably quite painful to the unfortunate subjects of it in all stages of its progress. At its first commencement it causes lameness, and this continues to increase, until with the advance of the malady the sheep is no longer able to endure the agony produced by standing erect. It lays itself down, never to rise more. Partly upon its knees, for two or three days it creeps around

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a limited space to glean the few mouthsful of sustenance within its reach, and having gnawed this to the very roots, unable to stretch itself farther, the miserable object dies from starvation,

Much more commonly, however, its life is terminated in a different, but not less pitiable mode. The fetor of the sores upon its feet attract to them numbers of flies. These deposit their eggs in the sores. From these fly-blows, maggots are hatched which throng the sores as thick as they can be crowded. Moreover when the sheep lies down for repose, its feet are naturally placed under it, in contact with its body and always touching the same spot. The wool growing upon this spot, becomes hereby impregnated with the matter which issues from the diseased foot; and after a time a portion of the maggots forsake the foot and make a lodgment upon this spot, nestling in contact with the skin and sheltered and concealed amid the wool. Their abode here at length becomes obvious by a spot, it may be the size of a man's hand, appearing externally as if the fleece was there wet or saturated with grease, and on examination it is found that the wool here is loosened from the skin and is pervaded by myriads of maggots. This spot rapidly increases in size, and the maggots at length become so excessively multiplied that numbers scatter themselves abroad, crawling through all parts of the fleece, producing a degree of irritation and torment that soon puts a period to the life of the animal.

168. *Its treatment.*—It is surprising that farmers, and even good farmers, that are humane and choice of their flocks, can tolerate a disease that is liable to produce such results, when by suitable care it is well known it can be perfectly eradicated. Was every flock owner to do what duty and humanity calls for in this matter, this disease would soon become extinct in our country.

A number of receipts for the cure of this disease have been given in agricultural publications, most of them there is little doubt depending for their efficacy upon a single ingredient, which enters largely into their composition. This ingredient is blue vitriol (sulphate of copper,) and there seems to be no good reason for combining this with a half dozen other substances and making a complicated recipe, the virtue of which depends after all upon this one article. Other caustics are perhaps as good as this; but this having been amply tested and its efficacy clearly ascertained, there is no occasion for searching further, or trying to find out with how many other articles this can be combined and still retain its power. Every intelligent physician endeavors to make his prescriptions as simple as possible, and when he has one article that he knows will answer his design effectually, he avoids lumbering that arti-

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cle with others that can in no wise increase the certainty or speed of its operation. It is the empiric only, that, ignorant of diseases and their true remedies and firing at random, puts a handful of shot into his gun with the hope that some one of them will hit the mark.

The best time to extirpate this disease from a flock is the fore part of the season. When the sheep are got up to be tagged, their feet should be carefully examined. Every one that exhibits the slightest ulceration at the root of the hoof, giving off that offensive fetor peculiar to the foot-rot, should then be separated from the rest of the flock. A person acquainted with this disease can tell with certainty every sheep that is affected by it. As this examination is making, spirits of turpentine should be poured into the clefts of the feet of all the sheep ascertained to be sound, in order to wash out and destroy any particles of the virus that may be lodged there. This will secure the unaffected members of the flock from having the disease break out among them. The diseased sheep must henceforth be kept by themselves, until the whole are cured. To effect this cure the hoof must be cut away so as to freely expose all of the diseased part. This is an indispensable part of the treatment. It can commonly be performed without putting the sheep to any severe suffering. But sometimes the affected parts are sore and tender, and if the point of the knife accidentally touches the quick, the sheep may get to struggling so violently that it will be necessary to tie its feet to complete the work in hand. Apparent cruelty here, is mercy to the animal in the end. The foot, moreover, in some cases gets to bleeding so profusely that it is impossible to see whether the whole of the hoof over the sore is removed; the timid operator often hopes he has exposed the whole of the diseased part, and desists when his object is but partially accomplished; and he hereby is under the necessity of renewing it at a subsequent day.

The hoof being pared away so as to expose the whole extent of the ulcer, blue vitrol alone or in combination with other substances is to be applied to its surface. G. Campbell informs me that the dry powder, formed by pulverising this salt, freely dusted over the sore, is all that is necessary, and is as efficacious as any application can be; the sore being hereby entirely healed over in a majority of cases, within about five days, and a perfect cure accomplished. Others, in addition to dusting with vitriol powder, pour spirits of turpentine upon the sore, but I doubt whether this contributes anything towards the cure. It will, it is true, repel the flies from depositing their eggs here; but if the vitriol alone excites a healthy action, causing the sore to heal so speedily, there can be little danger of the exposed part becoming the nidus of maggots in the interim. If it is preferred to have this medicine in the form of a

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wash instead of a dry powder, the formula of the late Mr. Grove, which has been used by many in this vicinity and is known to be perfectly efficacious, may be followed. It is this. Blue vitriol, four ounces, verdigris (Acetate of copper) two ounces, dissolved in a junk bottle of urine. No one, however, who is conversant with the *materia medica*, will be inclined to regard the verdigris or the solvent as imparting anything to the value of this prescription. A saturated solution of blue vitriol in water, that is, about four ounces to a pint, there is scarcely a doubt will be equally efficacious, if not more so, in consequence of being free from any extraneous matter.

The essential feature in the treatment of this disease is, that every part of the sore be touched with blue vitriol or some caustic analagous to it. In order to insure its application to the whole extent of the diseased surface, it is indispensable that the hoof should be cut away so far that this surface will be fully exposed and can be got at with facility. A single application of the caustic in most instances, cures the disease. After a week has elapsed, however, some of the sheep will be observed to be still lame. The worst cases are so inveterate, with the fungous granulations of the sore so exuberant, that a second and in instances a third application of the remedy is required. And it is not unlikely that the feet of some of the lame sheep when they come to be examined the second time will be found to be entirely healed and perfectly well to appearance; but on carefully paring off more of the hoof, the operator finds some of the old sore still existing, which had not been reached by the knife and the caustic in the first instance. He thereupon proceeds again to cut away the hoof sufficiently to expose all the remaining extent of the sore, and applies the vitriol to it as at first.

This course of treatment must be perseveringly followed up so long as the slightest indication of lameness is perceptible in any individual of this diseased lot. And they should thereafter be continued apart from the other sheep until the proprietor is perfectly sure that there is no vestige of the disease lurking among them to again break forth and spread through the flock. Thus the disease may be infallibly eradicated.

A person thoroughly experienced in this disease, but now out of the wool-growing business and therefore disinterested in this matter says, if he was purchasing a flock of sheep, he would be willing to take diseased ones for twenty-five cents per head less than what sound ones are worth, so certain is he that every one can be cured, at an amount of care and expense equivalent to that sum.

159. *Black-foot or fouls.*—There is an opinion somewhat current among us, that there is in addition to the foot-rot another species of

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lameness to which sheep are subject. This is here named the "black-foot" and is probably the same affection which is designated the "fouls" in Mr. Morrell's valuable work, (The American Shepherd,) and which is also briefly alluded to in Blacklock's Treatise, without any name. Nothing very definite respecting this disease is given in books, and the information I am able to gather in this district is far from being full and satisfactory. According to the current accounts it is a lameness similar to and frequently confounded with the foot-rot although it is entirely distinct. It is sometimes so severe that the sheep does not attempt to stand upon its feet, but hobbles about upon its knees and feeds in a recumbent posture. It is caused by pasturing on lowlands and disappears spontaneously and without any medication on removing the flock to dry, mountain lands. It is said that instances have occurred in which sharpers acquainted with this disease have taken shameful advantages of those who were ignorant of it, and have obtained valuable flocks at a great discount, the owners supposing them to be dangerously diseased with the foot-rot, whereas the more knowing purchasers by merely driving these sheep to a mountain pasturage in Vermont, have at once restored them to perfect soundness.

CONSUMPTION OF WOOL IN THE COUNTY.

170. *Woolen manufactories.*—A few statistics showing the extent of the manufacture and consumption of wool within the county, remain to be given, to complete the history of this branch of our industrial pursuits.

There are thirteen woolen manufactories in operation in the county at the present time; one at Union village, and another on Indian river in Granville, having been burned within a few years past, and not yet re-built. An establishment intended for a larger business than any of those now in the county, has been erected the past season (1849) at Fort Miller, but is not yet in operation. The location of those factories now in operation, and the amount of wool annually consumed by each is about as follows:

On White Creek, at White Creek village,		consuming	9,000	pounds.
On Owl Kill, near North White Creek village,		do	4,000	do
On Batten Kill, at Eagleville, in Salem,		do	20,000	do
do	Shushan, in Salem,	do	15,000	do
do	Clapp's Mills, in Salem,	do	10,000	do
do	East Greenwich, in Jackson,	do	35,000	do
do	Galesville, in Easton,	do	30,000	do
On Moses Hill, at Argyle village,		do	10,000	do
On Hudson river, at Sandy Hill, in Kingsbury,		do	10,000	do
On East Creek, at South Hartford village,		do	10,000	do

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On Mettowee river, at Granville,	do	25,000	do
On Poultney river, in Hampton, two	do	22,000	do
Total of wool manufactured in the county,		200,000	do

Some of the smaller of these manufactories suspend their operations about two months of the year, from January till March. The number of operatives employed is in proportion to the amount of work that is done, from nine to twelve being required in each of the larger of these establishments, nearly half of whom are females. From eighteen to twenty ounces of wool is required for producing a yard of fulled cloth. All these establishments are chiefly occupied with "custom work," that is, wool brought in from the neighborhood to be manufactured into cloth and flannel for family use. The current charge for manufacturing colored fulled cloth is about thirty-one and a fourth cents per yard. And it is the coarsest grades of wool grown in the county that are here manufactured. The wool grower obtains a higher price from the buyer by allowing him to throw out from the lot a certain number of the coarsest fleeces. These rejected fleeces are nearly as valuable to the grower for his own family consumption as the finest would be. Hence it is these that are taken to our manufactories; and the machinery of these establishments is therefore adapted only for the coarser grades of wool that is produced among us.

The larger of these manufactories, however, are capable of doing an amount of business considerably greater than that which is furnished them by the neighborhoods in which they are located. To keep their machines running the year round, therefore, the proprietors purchase considerable quantities of the coarser wools, obtaining commonly about three-fourths of their supply within the county, and the remainder from the city markets. The cloth thus manufactured by them on their own account, is disposed of in the New-York market. About one-fourth of the woolen cloth made within the county is thus carried out of its bounds leaving 150,000 pounds as the quantity consumed within the county.

In connection with this subject it merits to be stated, that soon after the power loom was invented, by which such an important improvement in the manufacture of cotton was effected, one of our most intelligent and experienced woolen manufacturers at that day, the late Zaccheus Atwood of Salem, made a visit to Giles Tinker of North Adams, Mass., who was engaged in constructing these looms, and explained to him some modifications, by which, as he conceived, the same loom might be applied to the weaving of woolens. Mr. Tinker hereupon came to Salem and erected for Mr. Atwood a loom upon the plan sug-

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gested. It fully answered their expectations, and the stipulated price, one hundred and twenty-five dollars, was accordingly paid for it; and this is said to have been the first instance in which the power loom was applied to the weaving of woolen cloths.

171. *Carding machines and fulling mills.*—In addition to the domestic cloth made at our factories, almost every family has at least a small batch of wool, yearly, made into rolls by the carding machine, which rolls are spun in the household, into yarn, for knitting, for weaving into carpeting or into flannel, &c. A portion of this home-made flannel is taken again to the mill to be fulled and dressed for family use. But the quantity of this home-spun cloth which is now made is quite small compared with what it was twenty years ago, and is annually becoming less.

The carding machines and fulling mills thus derive their business from this household manufacture of woolen fabrics, and are in operation but a part of the year. There are fourteen of these machines within the county, namely: four in the town of Granville, three in Fort Ann, two in Greenwich, and one in each of the towns of Argyle, Fort Edward, Hebron, Kingsbury and White Creek. From three to five thousand pounds of wool is annually carded into rolls by each of these machines. Some of the woolen factories also do a similar amount of this business, whilst others decline participating in it. The quantity of wool which is thus made into rolls for household use in the county is about 75,000 pounds.

172. *Quantity of wool consumed in the county.*—Of the 200,000 pounds of wool annually manufactured into cloth, as already stated, 150,000 pounds remain in the county for its own consumption. But only a moiety of the cloth worn in the county is obtained from our own factories. The finer broadcloths, and much coarse cloth also is derived by our inhabitants from the retail stores in our several villages, being procured by our merchants, with their other supplies, in the New-York market. It is estimated that half of the woolen cloth worn in the county is obtained from this source. There is, therefore, about 300,000 pounds of wool annually consumed in the county in wearing apparel, (which is seven and a half pounds to every inhabitant) and 75,000 pounds appropriated to various family uses. The county thus produces over 200,000 pounds annually, beyond what it consumes. The wool which it produces, moreover, is of a higher grade of fineness than that which it consumes. It thus appears that the wool business of this county, in addition to supplying the wants of its citizens, brings to them the sum of eighty or a hundred thousand dollars annually, or two dollars and fifty cents to every inhabitant.

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[My acknowledgments are due more particularly to A. Livingston, Greenwich, W. McNish and T. Milliman, Salem, C. Clapp and G., Campbell, Jackson, wool-growers, W. McKie, Salem, wool merchant, and W. Baker, Greenwich, manufacturer, for much of the information from which this paper has been prepared. A book of wool staples, containing samples from the different flocks of the county, including most of those mentioned in this paper, will be found in the Museum of the State Agricultural Society in Albany.]

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PART THIRD.

ROCKS AND SOILS OF WASHINGTON COUNTY.

173.—*A popular error.*—I find it is a common idea among many of our uneducated population, that our soils where they lie undisturbed, are at the present time gradually becoming consolidated into rocks; and some even suppose that the rock strata, and also the loose stones scattered over our fields possess a power of segregation—a power of attracting to themselves those loose particles of their own nature which are in the soil—and that hereby these rocks and stones are now actually growing. And the roundness and smoothness of the stones is regarded as evidence that they have thus been formed, like potatoes in the field, and onions in the garden. Nothing can be more erroneous than such ideas. The cases in which the loose earth is now becoming consolidated, are very few. Water holding lime in solution, in percolating through the soil is in some places depositing that lime, and is thus cementing the loose sand and pebbles together into a solid mass. In some of our clay banks, as the frost is coming out of the ground, a fine calcareo-argillaceous earth oozes forth, and runs down the bank, as we shall have occasion to notice more fully hereafter, which concretes, and becomes baked by the sun into solid clay-stones, and which also cements together any stones or gravel, with which it comes in contact. These are about the only instances in which loose earth is now being consolidated into stony or rock-like masses.

174.—*Soil is constantly forming from the rocks, and being removed by the rivers.*—The whole course of nature is tending in an opposite direction from that which we have spoken of, that is, to wear down and reduce to soil the rocks and stones of our earth. A vehicle never passes along the highway, the plowman never strikes a furrow through a field, the school-boy never draws his pencil across his slate, without wearing away and reducing to powder, something that had previously been in a solid state since the dawn of creation. Every shower that falls, washes from our hill-sides a portion of their soil, and the turbid brooks bear this into the larger streams. From a comparison of its size with that of streams where careful and extended observations have

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been made, we know that the Batten-kill alone takes out of this county every year over 200,000 tuns of soil. The several other streams carry away a yet larger amount; and we may safely estimate that over half a million tons of earth is annually removed from this county. To counterbalance this loss, every shower that falls is in one spot or another, washing bare a portion of rock, and thus exposing it to the winter's frosts, and the summer's sun, by which it is cracked and scaled, and crumbled in pieces.

175.—*Present breaking down of rocks, by frost &c.*—The power which the elements possess to soften and break down the solid rock where this lies so near the surface as to be exposed to their influence, we have exhibited to us constantly. Much of the slate rock underlying the county is worthless for any purposes to which stone is applied, in consequence of its inability to withstand the action of the air. Our citizens have often been deceived by it. Solid, handsome, durable looking stone as it appears when newly raised from the quarry, on being laid into wall, where it is exposed to the sun, and rain, and frost, in a few years cracks and crumbles into innumerous small fragments, and falls to pieces, slaking slowly, but similarly to stone lime, when it is exposed to the air. Portions of the slate-stones in walls, may everywhere be seen falling to pieces in this way, and causing the wall to tumble to the ground. Thus in a few years, solid rock melts down and changes to clay under our own eyes. Persons experienced in quarrying our stone are well aware that the deeper the quarry is wrought, the more solid and refractory the stone becomes. In consequence of this, it is a common custom at many quarries to remove so much as can easily be obtained, and let the quarry thereafter lie unworked for a few years, when the action of the elements will have modified another portion so much that it can be taken out with facility.

The freezing of water into ice is an active agent by which our rocks are being broken in pieces. Wherever water finds its way into the crevice of a rock situated so near the surface as to be exposed to the frost, the expansion of the water in freezing opens the crevice wider and wider every year until it splits the rock completely asunder. In an exposure of limestone on the farm of the younger Samuel Dobbin, in Greenwich, several clefts and fissures, some inches in width, now exist, where were no openings ten years ago. An interesting instance of this character, which was watched by several persons with some curiosity, occurred recently at the precipice a few rods west of where the road from Salem to Union village crosses Crossayuna creek. A mass of rock 6 feet thick, 8 feet long and nearly 11 feet high became loosen-

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ed from its bed at the top of the precipice, at first probably by but a thimblefull of water soaking into a natural seam or joint of the rock and there freezing. This huge block weighing over 40 tons, was annually crowded farther out, till in the spring of 1842 it fell to the foot of the precipice, breaking into a number of fragments.

At the falls of Dion-ondehowa below Galesville, much of the slate-rock is soft and shaly in its texture. The spray of the falls is continually dashing against this rock and in the winter season freezes upon it until the icy mass acquires such weight that the rock can no longer sustain it. Thereupon it falls into the stream, bearing with it a portion of the slate to which it has been attached. Thus this slate during cold weather is almost daily broken off and carried away by the stream.

176. *Nearly all of our soils have been formed from rocks.*—But causes have been in operation at an early period of the world's history to break down and wear away the rock-strata with an energy beyond anything which we now witness. Pick up every different stone and pebble, black, white, green and red that can be found in our fields and a mineralogist well acquainted with the localities of the country, can conduct us to each of the several places, some of them it may be ten or fifty miles distant where identically the same kinds of stone occur imbedded in and forming part of mountain masses of solid rock. Place the rough fragments of these rocks in a revolving cylinder, such as is used in the manufacture of marbles, and after a time, on removing them they are found to be partially rounded and smoothed off so as to be in no wise distinguishable from the pebbles as we find them in our fields. We cannot resist the conclusion that these pebbles have all been brought from the several sources where we find such vast quantities of precisely the same material now existing.

Take up a handful of sand and on inspecting it with a microscope it is plain to perceive that each different particle is the fragment of some mineral such as may at once be pointed out upon the shelves in our cabinets. In more than one instance, since the discovery of the Californian El Dorado has set the world agog, there has been brought me for inspection, carefully wrapped up in paper, a glimmering scale that had been detected in the plow field. On placing before the bearers of these a few specimens of granite pervaded with granular mica, they have at once perceived the plain identity of this last with their suspected treasure, albeit with a sigh on finding that all is not gold that glitters.

177. *This view of the earth's formation is not in conflict with the biblical account.*—This is not the place for combatting the common idea that the world came at once from the hands of the Creator in the form which we now see it—that each hill and valley was formed with rock

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placed here and soil strewed there, and that each stone and pebble was shaped as it is and dropped where it is, directly and immediately by the hand of God. I cannot refrain from observing, however, that such a crude idea is too degrading to the Deity to be cherished by any devout mind. I see a piece of cloth made of threads regularly and skillfully inwove by a complicated and curiously constructed loom; those threads so fine and even have by another ingeniously devised implement been spun out of a mass of soft, delicate fibres; those fibres have been beat out and cleanly separated from bundles of coarse, harsh vegetable stalks that had been made brittle by exposure to the sun and dew; these stalks were obtained by scattering small seeds upon ground that had been broken and mellowed by the plow. When I thus look through all the processes and singular changes that have been effected one after another by the aid of a variety of implements and machines of curious contrivance, I am pervaded with admiration of that human skill and knowledge and dexterity that is displayed in bringing out such a nice, pretty fabric from a few handfuls of seeds which were mere worthless rubbish to appearance. But I can form no such conceptions of man's wisdom and ability when I go into a manufactory of India rubber articles and see spread over a smooth surface a liquid which in a short time dries and concretes into a clothlike fabric, even though this should crystallize into an inwoven texture like the preceding. And so, if I regard the world as having been at once brought into its present form by the creative power, I can form no such exalted and sublime conceptions of the attributes of the Deity as when I see him at first forming palpable, tangible matter out of nothing, and then calling into action a variety of agencies to operate upon that matter, and modify and ameliorate it step by step in a hundred wonderful ways, until it becomes adapted for a convenient and agreeable abode for intelligent creatures. That the Omnipotent *could* suddenly form the world with the very structure that it now possesses, none but the skeptic will doubt. That he *did* thus suddenly form it, none but the ignorant can believe. And I know not why we may not regard the sacred oracles and geological science as harmonising and concurring to inform us, that at the very first, or, "in the beginning, God created the heaven and the earth." And *after* the earth was thus *created*, there came a time when all was thrown into confusion, by which animals and plants then existing were destroyed, "and the earth was without form and void." But from this chaos, perfect order was restored, step by step, in the space of six days, and then with the creation of man, the whole frame of nature was completed as it stands at the present day. Thus read, all discrepancy between

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that revelation which God has made to us in his word, and that equally authentic revelation which he has made to us in his works, ceases.

178. *Importance of the geology of this county, and sketch of the geological researches here made.*—Every fact throwing any light upon their origin, shows that the chief part of our soils have been formed by the breaking down of the solid rock strata, and that they have been brought into their present situations by the agency of currents of water. Preliminary, therefore, to an account of our soils, it is necessary that some account of the rock strata of this district, from which these soils have been derived, should be given.

The geologist within whose district this county was included in the recent state survey, informs us that "The geological structure of Washington county is more intricate, and its resources in useful minerals are greater than any other tract of equal extent in the first geological district, unless it be that in the counties of Orange, Putnam and Rockland."

The limestones, iron ores, &c. of this county, have been known from the time of its first settlement. But no definite information with regard to the particular strata that here occur was communicated to the world, that I am aware, until Prof. Silliman in the autumn of 1819, in his Tour from Hartford to Quebec, passed through the west side of the county and noted accurately the names and some few additional facts respecting its strata. That pioneer of this science in our country, the late Prof. Eaton passed several times through the county, and casual allusions to its geology occur also in his writings.

In the recent geological survey of the state, as our citizens deem, this county was passed over in a rather cursory manner. The result of the survey, so far as it relates to the rocks and mines of this county, occupies about fifteen pages of the final report. These, however, constitute a most important addition to what had previously been published.

Discordant views with regard to the age of the rocks of this district having arisen between the geologists, a re-examination of this county was made by Dr. Emmons, the result of which was included in his pamphlet on the Taconic system, published in 1844 and subsequently incorporated in his first volume on the Agriculture of the state.

So far as I am aware, the works now specified, comprise all that has hitherto been published, having a direct reference to the geology of this county.

The Taconic controversy, however, has caused our rocks to be visited and studied by a number of the most eminent geologists both of this and foreign lands; and Bald mountain in particular, as one of these remarks, has become "classic ground" to the votaries of this science.

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To attempt that detailed description of our rocks which the exactness of science at the present day requires, would lead me far beyond the bounds to which this paper must be limited. And I shall therefore only aim to present a brief general view of our strata, in a mode that will, I trust, make this subject plain and intelligible to the great mass of readers before whom these pages will come; and in connection therewith, report such facts as have occurred to my notice in the progress of the examination which has devolved upon me, which seem to shed light upon the disputed points with regard to these rocks. Some of these facts it will be perceived, bear one way, some the other. I have no theory to advocate; and design only to describe the appearances exhibited at such localities as I have examined and specify. And in constructing the geological sections herewith presented, I have aimed to picture the various rocky masses as they appear at the places indicated, using such names and epithets as are descriptive of those rocks.

179. *General view of the rock strata of Washington county.*—The most elevated and mountainous part of the county is the district bordering upon Lake George. We here find ourselves upon the unstratified rocks which form the primary range of northern New-York, and that extend across the vast wilderness tract that reaches from this county northwest nearly to the St. Lawrence river, and from the Mohawk north-east to Canada line. Starting from Lake George and travelling in a south-easterly direction, or what is more satisfactory as taking us directly across the strata at right angles with the line of their bearing, passing eastwardly first across the northern and then across the southern parts of the county, in the course followed in the geological sections herewith presented, we meet successively with different rocks, as follows:

The primary continues as we pass over a succession of black, rugged hills and mountains, until reaching Wood creek and the Champlain canal we arrive upon the borders of an open, nearly level country, which stretches off to the east and south. And here, reposing upon the granite rocks we have passed, we find a hard, white sandstone, appearing in even, uniform layers, commonly in precipices resembling walls of masonry. This is the Potsdam sandstone. Crowning the precipices in which it appears and reaching east from them, we observe a gray and much softer rock, composed of lime and sand in variable proportions, the calciferous sandstone. As we pass further east, we reach a pure limestone of a leaden blue color, very compact and fine-grained. This is the Chazy limestone of our state geologists. Finally beyond the limestone and at a distance of from three to six miles from the primary, we come upon slate, and this continues to be the prevailing rock, east and south, over the remainder of the county. It is dark

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colored, and crumbles into small fragments where we first come upon it, but becomes lighter colored, commonly some shade of gray, and is solid and even bedded as we proceed east; and every where through it we meet with beds or layers of gray sandstone and blue limestone.

Passing a few miles to the east of the south part of the county to ascertain the connections of this slate in that direction, we find it here assumes a green tint and a soft texture, and here we come to limestones, either pale blue and checked with white calcareous spar, or pure snowy white. Beyond this we reach a white or light brown and vitrified sandstone or quartz rock, and to this succeeds the granite or primary rocks of the Green mountain range.

From this sketch it will be perceived that this county is situated mainly in a trough, as it were, that intervenes between the primitive formation of Northern New-York and that of New England. In a direct line it is here from 25 to 30 miles across from the primitive rocks of one of these ranges to those of the other. And the strata of this county are the lowest palæozoic rocks known to geologists, that is, they are the lowest of those rocks that contain any organic remains. They are deposited when the first species of vegetables and animals began to have an existence upon our globe. They are admitted on all hands to be sedimentary rocks, that is, they were deposited from water, and consist of the sand and mud and silt that settled from the sea that enveloped our earth before the dry land was made to appear.

We have within the bounds of this county the whole series of strata forming the Champlain division of the New-York system; and if the Taconic rocks be distinct from these, we have all the strata recognized as pertaining to that system, except its lowest member, the quartz rock.

180. *Granite formation, its extent and character.*—This rock directly underlies nearly all of the town of Putnam, the whole of Dresden and those parts of Fort Ann and Whitehall which are situated to the north of Half-way brook and west of Wood creek. Comstock's landing is the only point where it reaches to the east side of the Champlain canal. About 118,000 acres or slightly over one fifth of the county is underlaid by this rock. It is a granite and gneissoid rock of the same character as in the contiguous counties of Warren and Essex and differs notably from the corresponding range of the Green mountains, being nearly destitute of mica and composed largely of felspar which is mostly of a gray or reddish color. Hornblende, garnets and magnetic oxide of iron are in some places disseminated so largely through the rock that they seem entitled to be regarded as one of its constituents.

181. *Iron Ore.*—Two valuable minerals are being furnished to the world at the present day, by this rock, from within the bounds of this

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county, viz: iron ore and black lead. Beds of iron ore have been opened, both at Mount Defiance and in the north part of Dresden, and there is little doubt that they occur in all parts of this range from Ticonderoga to Fort Ann; but it is only in the last of these towns, in the neighborhood of Mount Hope furnace that the mines are at present worked to any extent. This is the only smelting or high furnace within the county, and the company to which it belongs is also the proprietor of most of the mines that are as yet known in the neighborhood. The furnace is situated two miles up Furnace brook from the head of south bay, and about a mile from Furnace pond. It gives employment to 150 or 200 men and 50 teams, and is making some 1,500 tuns pig iron annually. About a third of the ore is obtained from down Lake Champlain and the remainder from different ore-beds in the vicinity, this admixture forming a better quality of iron, I am told, than either ore does separately.

182. *Graphite.*—Graphite, plumbago or black lead, (which is lead only in name, the mineral being composed of carbon with a slight admixture of iron commonly, but none of lead,) the material from which pencil-points are manufactured and which is in extensive use for polishing stoves, diminishing the friction of wheel-axles, &c., is disseminated through most parts of this rock, and occurs in abundance in the north part of Putnam, from which town is obtained a portion of "Ticonderoga black lead," which has superseded most of the other kinds of black lead in this section of the state. It is at present afforded at fourteen dollars per hundred weight. Twenty-two thousand pounds of this mineral passed the port of Whitehall in 1834, mostly from the vicinity of Ticonderoga, and the quantity has greatly increased since that date. Alexander Robertson, Esq., informs me that no exploration has been made to ascertain how abundant this article is within the town of Putnam—that one of the men engaged in this business at Ticonderoga comes with his wagon to the north-west part of Putnam, digs what he wants out of the rocks, carries it home, and when this is sold out he comes again. Every housewife will hope that the supply may prove to be inexhaustible, so superior is it in its crude, native state, to the old "British Lustre," or any of the other polishing substances known.

183. *Present condition of this tract of country.*—This primary tract at the north end of this county well illustrates how much the character of a county depends upon its geology and topography. Although this tract is in direct proximity with a highly cultivated district, nearly all of it is still in a state of nature, the meager soil of its rugged hillsides having discouraged all attempts to reclaim it. It is a lumbering and mining tract, and such it will continue to be, its sparse population ob-

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taining their food more from the adjoining districts than from the soil on which they reside. It is a most inviting district to the miner and mineralogist and a most repulsive one to the agriculturist.

184. Potsdam Sandstone.—*Its extent and character.*—Wherever in this county we step off of the granitic range just considered, we come into one of the hardest and most refractory rocks of which we have any knowledge. The Potsdam sandstone is well exhibited all along the valley of Wood creek from Whitehall to Fort Ann, and thence west along Half-way brook to the line of Warren county. At Whitehall the stratum has a thickness of 200 feet or more, but becomes thinner towards Fort Ann. It is mostly seen in precipices facing the west, and occurs in uniform layers a few inches in thickness, looking like regular courses of masonry laid up for the wall of some stupendous fortification. In the neighborhood of Winchell's creek and Mason hollow occur deep narrow dells and defiles, bounded by perpendicular walls of this rock, sometimes branching and running into each other and having a most singular and romantic aspect, causing the beholder almost to fancy himself among the ruined castles and towers of the days of old. It is a white sandstone, often stained or tinged with red, of a harsh texture and an earthy rather than a vitreous aspect.

185. *Its hardness, as displayed at Flat rock.*—A locality of this rock which many readers will well remember, is two miles north of Fort Ann village, at Flat rock. The main road from Albany to Whitehall and Canada here passed over a naked, flat surface of this rock, some rods in width, and sloping like one side of the roof a house, the inclination being to the south of east at an angle of ten degrees. But in constructing the Whitehall railroad it became necessary to cross this same spot and to give a new direction to the highway. And here was the most formidable and expensive section of that railroad, which having been taken and tested and abandoned by several contractors was finally worked out by laborers employed directly by the company. Of this sandstone, 8,500 cubic yards were here required to be excavated; and as a criterion by which to judge of its hardness, it may be stated that three men could perforate it with drills only five feet in a day, whilst in the contiguous calciferous sandrock they easily go 20 feet or more in the same length of time.

186. *Varieties in its structure and surface.*—The lower part of this rock puts on a deep red color and gradually changes into the gneiss rock beneath it, so that it is impossible to tell by which name certain specimens should be labelled. This transition may be seen in the north part of Fort Ann and also near the ferry in Putnam.

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At the upper part of the stratum the layers become thin and slate-like, and on the surface of these branching and slightly elevated marks occur resembling the roots of trees. These are regarded as the relics of a fucoid, (sea-weed,) which is supposed by those who reject the Taconic system to have been one of the first species of the vegetable kingdom that was created in our world. Layers with these remains occur on the west side of Skene's mountain near the summit. In some places, lower down in the stratum, the surface of the layers are covered with ripple-marks as regular and perfect as those newly formed in the sand upon the sea-shore.

187. *Economical uses.*—The uses to which this stone is applied are few. It furnishes the best of fire-stones for furnaces, and other situations where a high and continuous heat is maintained. It is also employed as a flagging-stone for the side-walks of the villages of Whitehall and Fort Ann, but on account of its hardness it is so difficult to quarry and break into blocks possessing such irregular sides that it is little esteemed, particularly as the same neighborhood where it occurs abound in stone much superior for laying a close jointed wall. For wall fences it is also much used, and is superior to any other stone.

188. CALCIFEROUS SANDSTONE.—This is a rock intermediate in its situation and also in its composition between the sandstone below and the limestone above it, being as its name implies, a sandstone in which a portion of lime is present. Toward its lower part it is nearly a pure silicious rock and loses this character more and more as we proceed upwards, and the transition is so gradual that in many places it is impossible to tell where this rock ceases and the limestone above it begins. Hence the amount of surface that is underlaid by it cannot be estimated with any degree of definiteness though it is not extensive. It forms the summit of most of the precipices of which the Potsdam sandstone is the base, and like that is an even bedded rock, its layers preserving a uniform thickness through a great extent, and being so much more soft than the Potsdam it is readily quarried into square and smooth faced blocks. Hence for flagging purposes it is decidedly the prettiest stone of which we have any knowledge, its quarries furnishing slabs and blocks of any thickness and size that may be desired. A most valuable quarry has been extensively wrought upon the east side of the canal north of Dewey's bridge, chiefly for abutments to canal bridges and for fortifying the canal banks. The stratum here possesses a thickness of nearly or quite 200 feet. A few years ago these stone were sold for six dollars per solid yard; they are now furnished for two and a half to four dollars. Other quarries exist in the county perhaps equal in value with

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this, but less extensively wrought, in consequence of being less conveniently situated for transportation.

189. Chazy Limestone. *Its Range and Character.*—At a distance of commonly a mile to the east of Wood Creek, the calciferous sandstone is succeeded by the pale blue or dove-colored chazy limestone, which has here a breadth of two or three miles, reaching east to the west bank of the Mettowee. Considerably broken and of variable width, it skirts the calciferous, from hence south and south-west through its whole extent in this county. It occupies the north-west part of the town of Hartford, and re-appearing to the west of Wood-Creek, passes through the town of Kingsbury, and onward thence to Glens-Falls, changing to a darker color, and finally to a jet black, as it shoots off in this direction. It is a most interesting fact, that in tracing this stratum across this county, in a distance of ten or twelve miles, as we pass out of the Champlain into the Hudson valley, it becomes changed from the most perfectly marked chazy limestone into equally well marked bird's eye and Trenton limestone. Thus after preserving its general character of a dove-colored lime-stone for a distance of a hundred and fifty miles through the whole length of the Champlain valley, we here place our finger as it were upon the very point where it suddenly changes to a nearly or quite black limestone, which continues to be its predominant color from hence through a circuit of over two hundred miles up the Mohawk and by way of Black River to the outlet of Lake Ontario. What could cause such a marked change here at the elbow, where this rock leaves its southern course and tends to the west? It is an indication, we think, that there really has been a metamorphic agency along the eastern side of the New York strata to change the appearance of the rocks here, and the inference must follow that had this agency been more intense it would have changed this limestone to the snowy whiteness of the Stockbridge limestone.

The situation in which we have found fossils belonging to the Trenton limestone associated with the *Maclura magna*, will be more particularly stated hereafter (§223). Suffice it to say, that by its fossils and by tracing the stratum continuously, the indications here are that the chazy limestone instead of being an older deposit than the Trenton, is merely the same rock, partially altered in its appearance by some metamorphic agency.

190. *Oolitic and other surface marks.*—Both in the calciferous and in the lower part of the chazy where it has passed to a perfect limestone, in the vicinity of Dewey's bridge, the surface of the rock exhibits an oolitic structure, or in other words is marked with a number of contrentric rings forming circular spots from an inch to over a foot in diameter.

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Along the road from the Baptist church in East Fort Ann to North Granville, layers of this limestone may be seen, with the surface regularly marked and checked as if creases had been cut in it with a knife, when it was soft. Other layers may be observed with the surface covered with indentations, as though when it was in a soft state, loads of cobble-stones had been discharged upon it and then picked off, leaving their impressions crowded all over the face of the rock.

Portions of this stratum are much checked and veined with white calcareous spar. And in some places the appearance is as though the original rock had been wholly broken up into irregular fragments of a few inches in size and these fragments had been cemented together again, each in its place, by veins of spar.

Wherever we step off from this mass of limestone, which we have now been considering, we come upon slate, insulated in and surrounded by which we also find limestone analogous to this. We leave this rock for the present therefore, to allude to it further when we come to speak of those limestones which are separated from this more or less by intervening ranges of slate.

191. *Slates of Washington County.*—The slates are the predominating rock of this county and underlie more than three-fifths of its whole extent. They form a truly protean group if we regard them as all pertaining to one stratum. They differ more or less at every locality in color, texture, and composition, and the same principles on which the limestones contiguous to them on the west have been formed into distinct strata, will require a division of these slates into three or more strata. But, without reference to the scientific accuracy of such a division, convenience requires that to give a clear and adequate view of them, it should be made, and we therefore treat of this group under the three following heads.

1st. Black or *Hudson-river slate*, occupying the west side of the county, and here characterized mostly by the *graptolithus pristis* fossil.

2nd. Gray or *Taconic slate*, occupying the middle and by far the largest part of the range, and marked by the *Buthotrephis flexuosa*.

3d. Green or *Magnesian slate*, occupying the east side of the range and wholly destitute of fossils.

192. Hudson River slate. *Its range and extent.*—This slate is well exposed all along the Hudson from Baker's Falls to Schuylerville, and in the banks of the streams entering this river. In several places, also, it is elevated in ridges which project above the clay soil by which it is commonly overlaid. The exact line of separation, however, between this and the Taconic slate, is not clearly marked, and we here have the same difficulty that the English geologists experienced in attempting to

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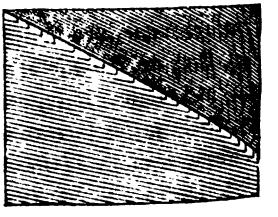
draw a line of separation between the Silurian and Cambrian strata. My own impression ever has been that this slate reaches east from the Hudson, about three miles, to the base of the Bald mountain range of hills; but to the north, in Hartford, the fossil which I regard as the best characteristic of the Taconic slate, occurs abundantly at the quarry near colonel Russell's, nearly three miles west of this same range of hills, and I am not sufficiently familiar with the topography of the west part of that town to have a distinct idea of where the line of separation may there be considered as occurring. But, in general terms, I regard this slate as underlying the west half of the town of Easton, that part of Greenwich which is west of Galesville and Bald mountain, all of Fort Edward, nearly half of Argyle on its west and northwest side, all of Kingsbury to the south and east of the limestones of that town, and the western part of Hartford, a belt of this rock skirting the east side of the limestone of this town, and extending into East Fort Ann, the vicinity of the old Baptist church there, being its northern termination, as I think, in this direction. It thus forms the basis rock of about 90,000 acres or nearly one-fifth part of the county.

193. *Its character.*—This slate is of a black or blackish color, and is generally a shale rather than a slate, breaking and crumbling when exposed to the air into small angular fragments, forming what has been well designated a "slaty gravel;" in several of the certificates of crops handed in to our Agricultural Society. It dissolves into soil more readily than most of the other slates of our county, and hence is not well adapted for wall-fences, or any other purposes to which stone are usually applied. At most places it appears so crushed and broken, that it is difficult to determine the direction and amount of its dip. A somewhat interesting instance, illustrating the fact (so difficult for many to believe) that these rocks of our county have actually been broken and slid out of their original places, is presented in the annexed figure, where it is evident that the upper mass has been at some time moved towards the left, whereby the ends of the laminæ of the mass on which it was resting have all been bent and turned upwards in the same direction. The sketch was taken from the north bank of the brook that enters the Hudson in Easton, two miles above Van Buren's ferry. Analogous instances where the disturbance has been more violent and produced much greater confusion, everywhere occur, but fail to exhibit such simple and clear evidence of their cause, as is here exhibited. And the friction produced by the rubbing and



Slightly bent laminæ of slate. Easton.

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grinding of these rocks in contact with each other, appears to have caused that smooth, glossy, striated surface, which constitutes what is called "glazed slate." And in some instances the heat which this friction has occasioned has been so great that it has actually melted the silex contained in the slate, causing it to run together and form white veins of quartz in the rock, the sides of which veins exhibit a striated surface similar to that which the glazed slate possesses. Such veins of white quartz may be seen at Dion-ondehowa Falls, and two series of striæ are often visible, varying from each other by a slight angle, thus seeming to indicate that the mass that communicated and that which received these marks were both moving at the same time and in directions nearly opposite to each other.

194. *Silicious or Frankfort slates.*—But though the general character of this rock is that of a brittle shale, exceptions occur in many places, where it puts on an even lamination, and silicious layers, some of them a few inches in thickness, are found, so hard even as to form good fire-stone. A quarry of this kind has been worked in Dirkeetown in a moderate uplift of this slate which forms the west side of the valley of Dead creek, from whence fire-stones for the furnaces at Glen's Falls are obtained.

At this quarry is exhibited the most perfectly of any locality within my knowledge the difference that is liable to occur in all our slates, between the laminæ of deposition and the laminæ of cleavage. The real plane of bedding is distinctly shown by numerous lighter colored lines and stripes, whilst the planes of cleavage cross these without producing the slightest break or unevenness, nor even does the heat of a furnace cause them to crack at these lines. At Dion-ondehowa Falls, and other places, these silicious layers may also be seen. They are of a dark gray or black color, and very different from those layers and beds of sandstone that occur in the Taconic slate. They correspond with the Frankfort slates of the New-York geological reports, and furnish specimens which perfectly represent those slates.

195. *Economical uses.*—In addition to what has already been stated, it may be observed, that in many places wells of excellent water are obtained from this slate, when those from the surrounding clay soil are hard. Springs of pure water, and also sulphur springs abound in it, frequently in the same neighborhood. That sulphur springs should be so common in this rock and so rare in the Taconic slate, is a singular fact.

The shale or slaty gravel furnished by this rock is one of the best materials accessible in many districts, for repairing the roads. Where these pass over the clays in the west part of the county, every moderate rain makes the surface slippery and fatiguing for a horse and most un-

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pleasant for footmen. But even a slight coating of slate broken in fragments, makes a vast improvement. The slate it is true, melts down into clay in the course of a few years, and therefore requires to be continually renewed. But where no material more durable is at hand, this is resorted to with great benefit. Some of the side walks in the village of Stillwater that were made over twenty years ago with this slaty gravel, remain good to this day, never working into mud with the most protracted rains.

196. *Taconic slate. This is upon another range or system from the preceding.*—The rocks that we have thus far considered have all been members of the New-York system. Commencing with the New-York primitive formation, we have ascended step by step the several strata to the highest member of that system that occurs within this county. We now pass on to rocks that evidently pertain to the Green mountain range, and that are New England rather than New-York rocks. They differ in many respects from the New-York rocks, and hence they have been considered by some as having been deposited anterior to them, and as forming a distinct series which has been called the Taconic system; whilst others maintain that they were deposited at the same time and have been merely altered in their appearance by a high degree of heat to which they have at some period been subjected. If not older, we can safely say they are *more gray*. Having ascended upon its one range we now descend upon the other, coming as we do first upon its highest member.

197. *Its extent.*—The Taconic slate occupies all of the county to the east of the Hudson river slate, except a narrow belt upon its south-eastern border and some tracts of limestone and sandstone of limited extent. And north of the point to which the Hudson river slate reaches, it occupies the chief part of Granville and Hampton, and nearly all of the eastern half of Whitehall. In short it is the basis rock of the eastern half of the county. Being thus extensive it is the rock in which the greatest portion of our citizens are directly interested, and underlies that part of the county which is the most advanced in agricultural improvement.

198. *Its color.*—On its west side where it is near the preceding stratum it is dark colored, and wherever it appears in contact with the limestone in that direction it is quite black. But quite soon after leaving its western border it becomes lighter colored, and over most of its extent it is ash gray, bluish gray or grayish brown. But its color is everywhere putting on a different hue and from the several parts of this stratum may be gathered specimens passing through almost innumerous shades of gray, brown, black, blue, green, clay yellow, purple and red.

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199. *Its composition.*—Silex is everywhere the predominating ingredient in this rock. A specimen taken in Jackson from what I judged to be the middle part of this stratum and a fair sample of the rock, was found according to Mr. Salisbury's analysis to consist of silex 71 per cent, alumine 20, with 2½ of soda and 1¼ of potash. And the roofing slate of Hoosic, according to Dr. Emmons' analysis contains 81 per cent of silex, with 13 alumine and 2 of carbonate of lime. In places where the proportion of silex is less the rock becomes more friable and disintegrates more speedily on exposure to the air. In many places on the other hand, the rock becomes almost pure silex, often with its lamination so crushed and pressed together and interwoven as it were, that it is broken with the utmost difficulty. This appears to be its prevailing character through a district a few miles to the east of and running nearly parallel with the Bald mountain range of hills. And the Troy and Rutland railroad will encounter a rock of this character between Clapp's mills and Shushan where the excavation will be as expensive as that of a hard sandstone. Generally these silicious slates are coarsish-grained and harsh, but in some places they are exceedingly fine and compact, forming the most perfect hornstone and chert. Our best locality of this kind is at South Granville, where, on the west or opposite side of the road from the burying ground is a precipitous ledge, 40 or 50 feet high, made up of alternate layers of hornstone and slate. And the dip of the rock is here reversed from what it is through the county generally, being to the west of an angle of 10 to 20 degrees.

200. *Its structure and dip.*—This rock always presents a slaty structure and its laminæ are generally flat and even; but in numerous places they are much bent, undulated and distorted. It is generally upturned and dips to the east at an average angle of about 45 degrees, but the amount of slope is everywhere changing; in some places it becomes vertical, in others it is horizontal. The rock readily splits in the direction of its lamination into flat slabs with a smooth upper and under surface; it is rare that it breaks and crumbles into small angular fragments like the shales which pervade the Hudson river slate. As a general rule the nearer the surface it lies the more fissile it is. Where it has been quarried to a considerable depth, as on the west side of Salem village, thick beds are sometimes reached, in which nearly all traces of a slaty structure disappear, and the rock may be sawed into slabs like compact limestone. Yet these slabs on being weathered soon begin to open and show their slaty structure.

201. *Seams and joints.*—Natural seams everywhere occur, crossing each other in such a manner as to divide the layers of this slate into

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blocks of a rhombic form of various sizes and different angles. These seams are commonly perfectly straight and are sometimes continuous for a great extent; and running frequently in a nearly vertical direction, by being filled with water and freezing the fissure is opened wider and wider, and where such fissures occur in ledgy uplifts they sometimes cause large masses of rock to be broken asunder and thrown down, as in the instance already mentioned. (§ 176.) In this manner precipices of considerable height have been formed in some places, the faces of which are as smooth as though they had been polished or worked off by a carpenter's plane. One of this kind may be seen on the west side of the road a half mile north of South Granville, where a high ridge of slate is abruptly terminated at its south end by a precipice 30 or 40 feet high, as smooth as a hay-mow cut down by a knife. A tiny brook runs along its base that has no doubt performed an important part in sweeping away the broken fragments that were here made.

202. *Dislocations.*—At the seams now spoken of dislocations frequently occur, causing a sudden and entire change in the character of the rock, so as often to deceive and disappoint persons who open quarries. Fine stone may be found at one place, and but a few feet distant, a joint and dislocation of the strata occurring, a worthless mass of shale may present itself, which has been crowded up to the same level. Thus, on the farm of Hon. D. Russell, Salem, to the north of White creek, thick bedded slate is obtained forming flagging and wall stones of excellent quality, but the quarry ends to the west in a mass of brittle fine shale. At the cascade and bridge at the mouth of Indian river, Granville, the stream runs several rods in a trough of blackish slate of an even, regular lamination, but a fault or dislocation crosses the stream beneath the bridge, bringing us on to a broken, undulated, disordered mass, and in one step we pass from perfect order and regularity in the stratum to perfect chaos. Instances analogous to these are abundant.

203. *Singular grooves and clefts.*—In some few cases we have deep, narrow clefts or ravines of a singular character presented to us, both in this and the magnesian slate to the east of it. Thus, through the summit of a ridge of soft slate on the farm of Milo Ingalsbe, Hartford, is a straight fissure, 20 to 30 feet deep and about 10 feet wide, running many rods in a north and south direction, looking as though it was the excavation of a canal, the bottom being nearly a horizontal level. In some places the slate upon its sides is worn and polished. It is difficult to believe that an iceberg could have such momentum as to plow out such a fissure by a projecting mass of rock frozen into its lower surface, yet

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this is the only cause I can conjecture as having produced this enormous groove.

Another, over a hundred feet in depth and some rods in width, with similar nearly perpendicular sides, but closed at its north end and open only on the south, occurs in Jackson, in the top of the hill south-east of the upper bridge across the Batten kill. This is many rods long, opening into Murray hollow; its bottom is nearly level, and it seems to have been caused by the rocks having been sundered and opened apart in this singular manner.

But the most remarkable gap of this kind with which I am acquainted is a few miles east of the state line, in the town of Sandgate, Vermont, at "the Notch," as it is called. The highway here descends through a cleft in the rock wide enough only to admit its passage, and walling it in on either side to a height in some places of 50 feet or more. The fissure runs first north and then south, curving like an inverted Ω, and is about twenty rods in length. It is at the summit of the road from the head of Camden valley east to Green river. And the wayfarer after toiling up hill after hill, on finding the road before him, abruptly pitching down into this narrow, dark, pokerish-looking gulf, with no visible opening ahead, feels as though he had got

> "Where gravitation shifting turns
> The other way; and to some dread, unknown,
> Infernal centre, downward weighs."

And as he descends through the pass, with gaze upturned, wondering what convulsion of nature could have caused this frightful opening, he shudders lest some similar convulsion should then occur, and re-close it over and around him.

204. *Quartz veins.*—No dykes of greenstone like those found to the north of this have here been found, but veins filled with milky quartz are not rare in this slate. The largest one of these that I have observed is in the north-west part of Argyle, a half mile south of the Hook, where the highway by the side of a brook ascends "the Mountain," as it is locally designated. Crossing the road, near the summit of this rise, runs a vein of crystalline quartz 18 inches wide, and exposed several yards in length. It is very compact and closely resembles the quartz rock of the Green mountains.

205. *Iron pyrites.*—This is disseminated not only through this but through all the Taconic rocks, and in so many ways has it deceived people that it well merits its sobriquet of "Fool's gold." It most commonly occurs in the form of cubical crystals, as true and perfectly square as the dice of a backgammon board and sometimes as large, but more commonly small and often only of the size of a pin-head. As these

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crystals easily decompose, stones are often met with from which they have disappeared, leaving a little cavity in the surface as square as though it had been carefully mortiсed with a chisel, and persons ignorant of this matter on meeting with one or more of these four-sided cavities in the surface of cobble-stones are often perplexed to solve the mystery how a hole could possibly have been drilled into so flinty a stone and worked out into so smooth and exactly proportioned a square, and whether this was done for some useful purpose or merely in a freak to show one's dexterity.

In other cases it occurs in the form of round nodules from the size of a pea to that of an ounce ball, and one found at South Granville and handed me for the State Cabinet of Natural History by D. McDonald is an oblate spheroid 3¼ inches in diameter, and two inches thick. These are commonly called "thunderbolts," and are popularly regarded as having descended with a lightning-stroke. As an illustration of the evils of such wrong impressions, I may here state that an instance is within my knowledge in which a person spent the chief part of a day in digging carefully with his hoe at the root of a tree that had been just previously struck with lightning to find this thunderbolt. But his search was in vain.

The instances are innumerous in which this worthless mineral has been mistaken for gold, so closely does it commonly resemble that metal in appearance. But I rejoice to say we have had several uneducated persons, who have notwithstanding possessed sense and shrewdness enough to take this supposed gold to a blacksmith's forge and have there been able to reduce it so far as to satisfy themselves it was nothing but sulphur combined with iron.

206. *Red slate, its range and extent.*—This pretty variety of slate that attracts the notice of every one on account of its bright color, causing it to appear at a slight distance like a bed of pure jasper, occurs nearly in a continuous line through the whole length of this Taconic slate, from Vermont to New Jersey. It enters this state in the town of Granville slightly north of the village, and appears all along the west side of the turnpike as far south as to Bull's store and the hills west of Ingersoll's temperance-house in the north part of Hebron, south of which it is nowhere seen along this road, and so far as I am aware it ceases in this direction for a distance of 15 miles, when we come on to it again on the farm of John Dobbin on the Jackson side of the Batten-kill south of Shushan. It again is lost under the soil of the Quassacook valley for a distance of four miles, when it re-appears on the farm of Nelson Simpson just below North White-creek. It here

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crosses the Owl kill and is seen again on the turnpike a half mile north of the checkered house. This is the most southern point of its occurrence in this county, of which I have any knowledge. It will thus be seen that we trace this slate in a nearly straight line running in a direction of about south by west, eight miles, when a break occurs of 15 miles, when we again come upon it, and follow it again for a distance of six miles. But what is most singular, where this break occurs, if we go some four miles west and pursue a line parallel with the first, we meet with this slate in the lower valley of Black creek, north of West Hebron, again on the farm of Mr. Walls, and from the town of Salem passing into Greenwich west of C. Morey's, and onwards to the west side of McDougall's lake, beyond which it nowhere occurs in this direction. It thus here appears almost continuously through a distance of five miles, and it seems as though what had originally been a continuous range of this red slate, had been broken off and crowded four miles to the west of its true situation; though it may be that there are two distinct ranges of this slate. A small locality which appears to be between these two lines, occurs on the old Moncrief farm in the north west part of Salem. And these comprise all the localities where I have observed it, though it is not improbable that others occur.

207. *Cause of its color.*—That the peculiarly bright red color of this slate is owing not to the material of which the slates here are formed, but to a particular degree of heat to which they have at some time been subjected is apparent from the following facts. It is quite common to meet with similarly colored slates in the rubbish about old fire-places. And in our wall fences I have several times met with specimens in which one end of the stone has been of this bright red appearance and the opposite end of the ordinary dull hue, the two colors not gradually blending into each other but separated by a distinct line of demarcation, and my inference has been that such stones had been lying partially buried under the soil where brush or logs had been burned in the early settlement of the country, whereby part of the stone had been shielded from the heat to which the other part had been subjected. Moreover we everywhere meet in our soils with pebbles of this same bright red color, which are more or less perfect jasper—which pebbles are almost invariably traversed by veins and strings of white quartz, and it is evident that they have been formed by melted silex running into and filling fissures in the slate, and the heat of this melted silex has changed the color of the slate contiguous to it to a bright red, and also baked, or rather, partially vitrified the silicious matter which the slate contained, into a hard flint-like mineral. These specimens of jasper, therefore, are in reality the gangue or matrix of the veins of quartz.

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208. *Inferences deducible from these facts.*—Subjects of this kind are not mere idle, profitless speculation, as to many they will appear. Scarcely a fact can be obtained in geological science but possesses some value in enabling us to read more closely the history of our earth. Thus, in the instance now under consideration, we see this range of red slate running paralled with the course of the Green mountains, at a distance of many miles to the west of them; and if we regard its color as having been caused by caloric, it must follow that at some time an intense degree of heat has pervaded that range of mountains, altering the rocks there from their original appearance, and that along the line of this red slate we reach the place where this heat extended only in a sufficient degree to cause the peculiar color which it wears. And as this tract of red slate crosses vallies and extends in a straight line from one range of hills unto another, it indicates that these hills and vallies were formed and that the surface of the earth had assumed its present shape, at least to a great extent, before this metamorphism occurred.

209. *Mica slate.*—Specimens have recently been handed me by Esq. L. Lakin, who tells me he took them from the rock in place, in the vicinity of Perkins' Hollow, towards the source of Dry creek, in the north-east part of Salem. They are well characterized Mica slate, in no wise dissimilar from this rock, as it appears to the east among the Green mountains, and satisfy me that beds at least of this slate occur within the county.

210. *Economical uses.*—It is singular that no quarry of roofing-slate has ever yet been opened and worked within this county, particulary as so much business in this line has been done upon our southern border in the town of Hoosic. There is no doubt that at many places slate of as good a quality as that of the Hoosic quarries exists within the bounds of this county, and that, in time, roofing-slate will be be extensively furnished from hence, unless in the progress of the arts it becomes superceded by some other material. Writing-slates may also be obtained at many localities, there is no doubt. And stone sufficiently compact and soft to be cut into slate pencils abound everywhere. There are but few school districts of the county where the children do not know of such localities, to which they resort more or less to supply themselves with these. They have never yet been worked here as an article of traffic; though lately this is a business that has been gone into in the neighboring town of Castleton, Vt., and many of our stores are now supplied from that source with a nicer article than anything we had previously been accustomed to.

At innumerous localities this slate is well adapted for being manu-

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factured into whetstones and hones. These of various qualities and degrees of fineness might be here obtained. But attention has never been turned in this direction. Only here and there a man, observant and curious about such things, has given any heed to picking up and testing the quality of our stones in this respect, and such men, it is well known, have often met with those that were of unrivalled excellence. Our mechanics, it is quite probable, in numerous instances, in going to the merchant to make a purchase have been treading upon and stumbling over articles of a better quality than any he could furnish them. There is little doubt that our silicious slates, had they the "Razor-strop man" to proclaim their qualities, would speedily become world-renowned, and after supplying the market for centuries, there would be "a few more left of the same sort."

In many places too, these silicious layers are sufficiently thick and hard to admit of being sawed into posts that may be of value for gates and some kinds of fences. One of our greatest desiderata is some material more durable for this purpose than our oak and chestnut timber. Should wire fences come into use, (and we have some instances where trial of them is already being made,) we are confident the most economical material for posts for these will be furnished from some of our stone quarries.

Fine flagging stones, for the sidewalks of streets, for the flooring of cellars, for the covering of cisterns and wells, for the bottoms of ash-houses, for the steps of public houses, of cellars, &c., are obtained at numerous places. The sidewalks of the villages of Cambridge, Union-village, Salem, Argyle, Hartford, and Granville, are mostly flagged with stones from this stratum. Of all the flags used in this district, the slate is the readiest and cheapest to obtain in large slabs, adapted for forming a broad smooth pavement.

The stone for underpinning houses and for walls laid in mortar are supplied in most parts of the county, from this rock. At many quarries however, stone that would otherwise be invaluable for this use are ill adapted for laying a smooth, handsome wall, in consequence of not possessing on either of their sides a square face. In other words, the transverse joints or seams instead of being vertical to the plane of cleavage, cross it diagonally and with an angle varying at every seam. Sometimes to obtain a square face the stone has been sawed. Generally, however, stones only, one of whose faces are nearly square are selected for the exposed part of the wall.

For the rough underpinning of out-buildings, this slate furnishes a material of the best kind. For wall-fences it is also invaluable; and a

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majority of the farms upon the range of this slate possess stone that may be quarried for this use to any extent desired. As yet our wall fences have almost all been made of the loose stone picked from the surface, to clear the land and better adapt it for the operations of the plowman. Such stone are always more or less rounded and worn, and hence do not make walls that will stand so firm as those stone that will hereafter be obtained more and more from quarries. Abundant as this material is, and scarce and valuable as rail and other fence timber is becoming, it is plain to foresee that walls will in time be almost the only fences upon our farms.

The quarrying of this slate is nowhere made a business, with us, the demand being so limited and the supply everywhere so abundant. At McArthur's quarry in Jackson, between Cambridge and Battenville, stone to the amount of from fifty to one hundred dollars have been annually sold for about ten years past. Flagging stones six and seven feet square are here raised. The best are delivered at the quarry for $2.50 per 100 square feet. The smaller and refuse stones of the quarry are sold for from fifty cents to one dollar per wagon load, being considerably in demand for constructing blind ditches or underdrains; those made with an open pipe about six inches in diameter being preferred to those made by filling the trench with cobble stones, inasmuch as the latter, it is said, are liable to become stopped and dammed up from meadow moles and other burrowing animals making their nests in them. Still, more of our underdrains are being constructed with cobble-stones than with an open pipe, at this date, with a view of clearing the surface of these stones, as well as draining it.

211. TACONIC SANDSTONE. *Its general aspect.*—The rocks that we have hitherto considered have been strata running continuously from where they enter to where they leave the county, and that are so well exposed on the surface that they can be satisfactorily traced out. We now come to speak of a sandstone and a limestone that only present themselves to our view as insulated rocks protruding through the Taconic slate. But they present themselves at so many points and often with such a thickness, that they seem entitled to be spoken of as distinct strata. And the sandstone in particular, we are prepared to show, has not hitherto received the notice that its character and extent entitles it to. It constitutes a prominent feature in the geology of this district. Its fragments are widely scattered through our soils. And in almost every valley may be seen towards the summit of some of the adjacent hills, jutting out from among the green verdure of the growing grass or grain with which they are clothed, a naked rock of a grayish-white color. With a smooth

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weathered surface and so hard and compact that even the moss and lichens are unable to take root upon it, it protrudes above the surface, having resisted those warring elements by which the other rocks around have been worn away and broken down into soil. It is a harsh gray sand stone, to appearance, with a slightly vitreous lustre, and is always traversed with veins or thin slender seams of white quartz. These veins often abound with rock crystals, which circumstance has given name to diamond rock upon the hill east of Lansingburgh, which is a mass of this kind. But the most striking peculiarity about this rock is, that wherever portions of it are covered by the soil and exposed to the roots of vegetables, it loses the lime which it contains, and hereby becomes changed to a porous and more or less friable stone commonly of a snuff-yellow color but sometimes brick-red; the inside of the stone remaining compact and unchanged. And over whole fields, the disintegrated matter from this rock imparts here a red and there a yellow color to the soil, the former color being particularly observable, as it is so unusual among the soils of this district.

212. *Its range and extent.*—This rock often shows itself as a mere subordinate bed of limited extent, in the slate, as in rear of the lower tavern at Salem village; or as a layer a few inches or a foot in thickness, as in the hill on the east side of Cossa-yuna lake. But at other times it appears protruding up from beneath the slate in masses often of one or two hundred feet in thickness. Around Summit lake in Argyle, if there is no duplicature here, this rock must possess a thickness of many hundred feet. It is frequently associated with the sparry limestone, though it appears to be always separated from that rock by an intervening mass of shale some twenty feet or more in thickness. But in numerous places it is wholly unaccompanied by any exposure of that rock, seeming to replace it as it were in ranges where that rock occurs. There would seem to be three ranges of this sandstone and the sparry limestone that may be tolerably satisfactorily traced through the county. This sandstone accompanies the Bald mountain range of hills, appearing sometimes in small masses below their western bases, as at Bald mountain (vide Geological section), at other times as a largely developed mass upon their summits and eastern sides, as at Louse hill* in the

*So named, it is said, from the following revolutionary incident. When Burgoyne's army was passing down the Hudson to Stillwater, a tory, resident in this vicinity, taking advantage of the confused state of the country, collected a number of cattle from the stock of his whig neighbors, secreting them in a secluded hollow upon this hill, with the design of driving them to the British camp and there selling them. In the meantime, however, the Americans took possession of the ford s upon the river and cut off all communication with the royal camp, and the unfortunate cow-driver was under the necessity of keeping his herd in the narrow c on

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north part of Easton, Summit lake, Bowen's mountain in Hartford, and at numerous points between and beyond these. This is its *western range*. Its *eastern range* is less extensive, but still well marked for a considerable distance. It may be traced from Cambridge, along the the east side of the Jackson hills, and by Fitch's point, passing two miles east of West Hebson and Munro's meadows. Whilst a *middle range* appears to pass by Cambridge-center, four miles north-west of Cambridge village, Battenville, the north part of Dwelly's hill, Lakeville, and Belcher. It shows itself however at several points out of these ranges, as at Centre falls, and a mile east of Post's corners in White creek.

213. *Its structure and composition.*—This rock is well exposed for inspection at the quarry of Jarvis Martin, north of Fitch's point, Salem. It has here been excavated through a length of 100 feet and a thickness of thirty feet, and the indications are that the stratum here has a thickness of at least 130 feet. It occurs in even beds, varying in thickness from a few inches to two feet, and these are separated from each other by thin seams of gray silicious and of black pyritous shale. The thicker beds are traversed by vertical seams causing them to be readily quarried into square faced blocks, and the faces of these are in several places wholly covered with small rock crystals from the tenth of an inch in diameter down to the minutest needle-like points. The rock here dips to the west at an angle of scarcely 10 degrees, and there are no indications of limestone anywhere in its immediate vicinity.

As already stated, fragmentary portions of this rock are commonly partially decomposed on the surface. The analyses that have been made by Mr. Salisbury, show with a definiteness that we did not previously possess, the composition of this rock and the change that takes place in it on exposure. The specimen analyzed was from the quarry above described. The solid rock was found to consist of 53 per cent of silica, 6 per-oxide of iron, 15 of carbonic acid, 13 of lime, and nearly 5 of magnesia. A trace only of the carbonate of lime and of magnesia was detected in the partially decomposed surface of the same specimen, and this porous yellow part was found to be composed of 91 per cent silica and 5½ of per-oxide of iron. The rock is thus shown to be a true calciferous sandstone. And like that rock, this also varies in the amount of lime

lines of the hollow till they were at length discovered, almost famished, literally covered with *lice*, and looking like anything but saleable beef. In derision of the mercenary speculator the hill at once took the name which it still bears. And those who inherit much of the patriotic fire of '76 will continue to cherish this name after the progress of refinement has discarded it. Tory's mountain is one of the spurs of this uplift.

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which it contains, becoming in some places a nearly or quite pure silicious rock.

214. *Its name and geological place.*—This rock, particularly where it appears overlying the limestone in the Bald mountain range of hills, has been and is very differently regarded by different geologists. Some of those partially disintegrated and red colored portions, as I suppose, were deemed by Prof. Eaton, in his survey of Rensselaer county, to be the Old red sandstone, (Memoirs Board of Agriculture, vol. ii. p. 6,) and Dr. Eights, having many years ago examined these red portions on Louse hill, is to this day of the opinion that the rock there is the Medina sandstone. I am strongly suspicious that some of those masses in Ulster county, that have been spoken of in connection with the Shawangunk grit, will prove to be this rock. But we have no sandstone in this county that I can regard as overlying the slate.

Most parts of this rock were regarded by Prof. Eaton, as the calciferous sandstone; and in this Prof. Mather has coincided with him. But restricted as that appellation now is to a stratum below the Chazy-Trenton limestones, it can no longer be applied to this rock. Dr. Emmons has regarded it as a mere subordinate to the slate, but the masses which he examined were small compared with those that have since been detected.

We have not space for noticing the evidence in detail that shows this to be a sandstone whose place is above the limestone, and below or in the lower part of the slates. We therefore cite only a single locality, which posesses double interest as showing more clearly probably than any other that can be found, the exact mode in which the New-England and New-York rocks meet each other In travelling down the bed of the Mettowee river from North Granville, particularly on the north side of the stream, as we pass from the Taconic slate on to the Chazy limestone numerous exposures of the rocks occur, whose strike is transversely to the course of the stream, and whose succession, apparent dip, &c., is as follows:

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JUNCTION OF THE TACONIC AND NEW-YORK ROCKS, METTOWEE RIVER, BELOW NORTH-GRANVILLE.

No.	Extent.	Dip.	Formation.	REMARKS.
1	.....	.....	Alluvial.	Interval meadows.
2	1¼ rods.	70° E.	*Taconic slate.*	Slaty limestone with Taconic fucoids.
3	2¼ rods.	76° E.	.....	Silicious slate in thin even laminæ.
4	20 rods.	.....	Alluvial.	Overlying soft shale?
5	10 rods.	60° E.	*Taconic sandstone.*	Thick and thin even beds separated by thin layers of black shale; rock crystals in cavities.
6	25 rods.	.....	Alluvial.	Overlying soft shale?
7	1¼ rods.	60° E.	.....	Silicious slate in thin even laminæ.
8	30 rods.	.....	Alluvial.	Overlying soft shale?
9	5 rods.	80° E.	.....	Black pyritous shale and slate.
10	15 rods.	80° E.	*Taconic sandstone.*	Even bedded, the beds seme inches in thickness and separated by thin layers of shale.
11	10 rods.	.....	Alluvial.	Probably overlying black pyritous shale.
12	5 rods.	80° E.	Limestone breccia.	Angular limestone pebbles imbedded in calcareous cement, the mass thinly interlaminated with black silicious slate.
13	20 rods.	80° E.	*Sparry limestone.*	Blue compact limestone, profusely checkered with calc. spar, with a few slaty interlaminations.
14	160 rods.	80° E.	*Chazy limestone.*	Vide § 221.

It will be seen that here is plain evidence of this sandstone above the limestone and in the lower part of the slates, presenting a thickness first of over 200 feet (No. 10), and again with at least 150 feet (No. 5.) This is where the Bald mountain range crosses the Mettowee river. How exactly the rock in the eastern range, over twenty miles distant (§ 213) corresponds, particularly with No. 5, will be obvious on comparing descriptions we give of the two.

This sandstone, more than anything else causes us to hesitate in regarding these Taconic rocks as cotemporaneous with the New-York rocks. In the New-York system we have a well-marked stratum of calciferous sandstone between the Potsdam and the Chazy limestone; we have no traces of anything equivalent to this, that I am aware, between the granular quartz rock and the granular or Stockbridge limestone. In the Taconic system, on the other hand, we have a calciferous sandstone immediately above the limestones, and nothing corresponding with this in the New-York series. We say it causes us to hesitate. Yet still, when we come to see how this sandstone is here associated with what is to appearance the same sparry limestone that elsewhere attends it, and that this limestone presents itself to us here as being merely the upper part of the Chazy limestone, it is far from giving us confidence in the correctness of the opposite view.

215. *Economical uses.*—Through all the district where it occurs, this sandstone is preferred to any other stone, for the walls of buildings and especially of cellars. It is so thick-bedded that it can be laid up rapidly, and it is readily obtained with square faces, making a smooth, even

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wall. But what causes it to be especially esteemed for cellars is, that it can be quarried into thick narrow blocks, and thus be readily laid to form a double wall, as it is termed, which will be frost-proof—whereas the Taconic slate is raised in such broad tables that it is difficult laying them without having them reach entirely through the wall, thus forming unbroken and rapid conductors of the caloric. All our cellars are now built with double walls; all of those in old dwellings have single walls, and require to be "banked" annually on the coming on of winter, to prevent the frost from penetrating them.

216. Sparry Limestone. *Its general character.*—Limestones are met with in the Taconic slate which are evidently mere subordinates of that rock. Sometimes insulated and worn boulders of limestone occur, as in the first slate below the falls of Galesville (vide illustration, § 219 under the letter D.) At other times we have a breccia, formed of rounded or angular pebbles of limestone cemented together, as at the bridge where the road from Salem to Union-village crosses the Cossayuna creek. Sometimes thin, even beds of limestone present themselves alternating with limestone-slate, as in a slight precipice several rods in length beside the road two miles from North Greenwich towards McNab's lake. But it is unnecessary to specify these minor peculiarities further, and we proceed to notice those larger tracts which appear as belonging to a distinct stratum underlying the slate.

The sparry limestone has been well defined, as being a blue or blueish-gray limestone veined and checked with white calcareous spar. A limestone of this character appears in insulated masses of various sizes at numerous points through the Taconic slate, and under the same circumstances as does the sandstone just described. It presents itself most prominently in the three ranges of that sandstone which have been indicated, but it occeurs also at several other points. Moreover, portions of the Chazy limestone, as is well known, present this same sparry character, and so far as we have evidence in this district, it is the upper part of that rock or a rock that directly overlies it (whichever way we choose to consider it,) in which these viens of spar chiefly occur. And extensive beds of similar character occur also in the white granular limestone, even in its lower part, as on the east side of the Manchester plains (vide Geological section).—this sparry rock being more coarse-grained and blueish-gray as it approaches the Green mountains and more fine-grained, compact, and dove-colored or leaden-hue as it recedes from them. And extending through this Taconic district in broken masses in the way it does, it presents much the appearance of a chain whose successive links connect a Chazy limestone on its west side to the white granular limestone on its east side.

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217. *Extent and character of the Bald Mountain limestone.*—Views very different and conflicting with regard to the character and age of the limestones of this district are at present before the world, and many arguments for and against the Taconic system are derived from them. Our most important deposit of limestone, that at Bald mountain, in particular, is in a most questionable shape. We have here a mountain a mile or more in length, and rising six or seven hundred feet above the level of the surrounding country, which is mostly made up of blue limestone which has been long and widely celebrated for the excellence of the stone lime which it yields. This mountain, as already intimated, is one of a range of hills which forms the eastern boundary of the immediate valley of the Hudson river, and which run continuously from the Highlands north through the middle of this county, passing into Vermont in the north part of the town of Hampton, from whence it is not unlikely it may also be traced onwards the length of the Lake Champlain valley. Here at Bald mountain the range is three miles east of the Hudson river at Fort Miller.

The limestone of this mountain is prolonged south by way of Galesville and forms the chief part of Louse hill upon its west side, having here a thickness of 200 feet or more. It also extends through the hills north of Bald mountain to the vicinity of Reid's spring. We thus have an almost continuous exposure of limestone here, eight miles in length, some twelve miles distant from any limestone the age of which is established—standing up in the midst of the slate like an island in the sea, and provokingly destitute of fossils to tell its name and the place where it belongs. Its lithological characters are equally discordant. In one place it is a uniform blue limestone; in another it is profusely traversed by veins of calciferous spar; at Bald mountain it is one of the purest of limestones; at Galesville it contains 20 per cent of silex and yields the best hydraulic cement.

218. *Its name and Geological place.*—That such a rock as this at Bald mountain should be differently regarded by different persons is not surprising. Prof. Eaton (canal survey, p. 79) considered the mass at Galesville to be the calciferous sandstone and at Bald mountain the metaliferous or Trenton limestone. Prof. Mather thinks there is no calciferous here; Dr. Emmons thinks it is all calciferous or its equivalent. This is the posture in which the subject stands at present. It is unpleasant to have this most noted and valuable limestone of our county in this equivocal position and be unable to label and send abroad specimens of it except with a quere. And its age is a matter of deep interest in connexion with the Taconic controversy, inasmuch as if this rock is the

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calciferous of the New-York survey, the slate in contact with and seemingly beneath it must be older than the oldest slates in the New-York series. It is obvious that fossils would shed the clearest light upon this subject of any kind of proof that we can have; but unfortunately diligent search for them has been unavailing. In an excursion made several years ago by Dr. Emmons, Prof. Hall and myself over the mountain two miles north of Bald mountain vestiges of two fossils were detected which we all agreed were too obscure to decide anything by, though I suspect neither of us doubted they were the *Maclura magna*. But, in the progress of this survey a discovery much more decisive of this mooted point has been made. In perfect preservation upon a fragment of limestone at the Friend's meeting-house three miles south of Galesville I have met with the buckler of the *Trinucleus concentricus*. Those acquainted with matters of this kind, therefore, will scarcely entertain doubts any longer with regard to the age of this limestone. It must be deemed the upper or Trenton portion of the New-York limestones and the sparry mass above them. The position of the Taconic sandstone at the western basis and on the eastern summits of these hills also forces upon us this same conclusion, if we have correctly ascertained the place of that rock.

219. *This range of hills supposed to have been formed by a fracture and uplift.*—What has most tended to mislead in this matter, is the idea that has all along been entertained, that this range of hills had been formed by a fracture of the strata and an uplift of the rocks on the east side of the line of this fracture—thus giving to them the contour which they present—being steep and precipitous on their west sides, and sloping off with a gentle descent on their east sides. How strong the marks indicative of such a dislocation are, will be apparent from the annexed view of the rocks as they are exposed at Galesville, where the Batten-kill passes this range of hills. Indeed, the most obvious inference is that at this locality a double fracture has occured, by which the masses C C have been thrown up. And here it will be noticed is a slate D presenting every appearance of having, by this elevation, been brought up to view beneath the mass C. Hence it would follow that there must be a slate older than the Utica and Hudson river slates, the place of which is directly

Galesville Falls.
A A, Batten-kill. B, Falls.
C C, Limestone. D, Slate.

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above this limestone. And as the Taconic slates reach from the Green mountains out to this Bald mountain range of hills, it has been supposed that they passed under these hills and were brought up to view at their western bases beneath the limestone. This has been one of the strongest arguments in favor of the Taconic system. It is not at these falls merely that we have this appearance. Just south of Galesville, where a large bed of sand has been within a few years removed, it has brought to view a shaly slate under the hydraulic limestone there. And two miles north of Bald mountain is a hill, all the upper and east portion of which is limestone, but on descending its west side slate is come upon, forming the west base of the hill to the height of some hundreds of feet.

220. *Supposed by others to be formed by a plication or fold of the strata.*—Upon the supposition that these hills have been formed by a fracture and uplift, this evidence in favor of the Taconic system is obviously irresistible. And this has led those who have taken the opposite view of the subject to suggest that these hills were formed by a plication or fold and overturning of the rocks, and that the slate which juts out at their west bases was originally prolonged upwards over their summits and downwards on their east sides, thus connecting the slates of the two sides of these hills, instead of passing under them, and that subsequently this slate had been denuded and worn away leaving the limestones exposed as we now find them. And this, I am told, was the view Mr Lyell was inclined to take on examining this locality at Galesville, founding his opinion upon overturnings which he had observed in the strata of the Alps that would be analogous to this. But in the whole range from Whitehall to the Highlands no direct evidence of any such plication in the strata has hitherto been known to exist; it has merely been inferred by the one party and disallowed by the other. And at first glance it would seem to be wild to deem that such a fold could occur and never to this day have been detected along the sides of the many streams that cut through those hills to enter the Hudson from the east. Where, it might well be asked, have the eyes of our geologists been, that they have never seen it?

221. *Evidence that such a fold exists.*—But, if we follow this range of hills from Batten-kill, north, at the end of twenty-five miles, we come to another considerable stream passing through it; and here we meet with evidence that this supposed fold really exists. It is at the falls of the Mettowee river, at the head of Gilder's hollow,* about a mile north west of Granville academy. The annexed cut presents a view of the

* This romantic dell derived its name from a revolutionary incident akin to that related on a preceding page, but of a more tragical character. Whilst Burgoyne's

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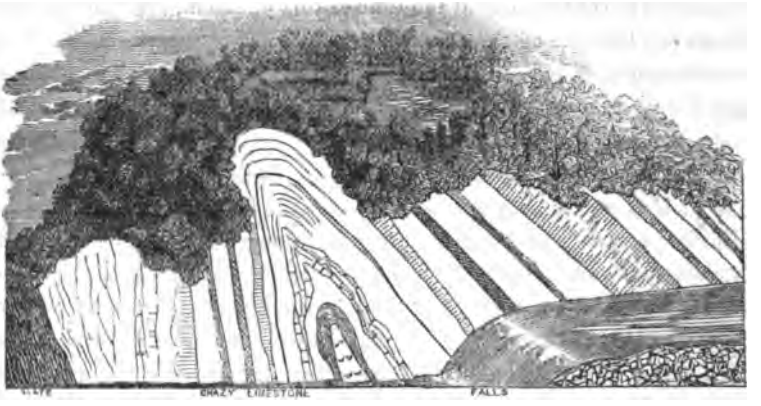

Plication of the rocks at the falls of the Mettowee, below North Granville.

strata as they appear at this place on the north side of the stream in a vertical precipice some forty feet in height. On the left we have the black shale or slate out-cropping in the same situation and in essentially the same manner that it does at Galesville. To this succeeds a thick, molten mass of limestone in which no distinct lamination can be traced. We next come to successive layers of pale blue, buff-yellow, cherty and slaty limestone. We then reach a synclinal axis, the out-cropping ends of five or six layers of the limestone being distinctly traceable upwards upon the one side of this axis, and downwards upon its opposite side. Beyond these we come to a series of layers, each in its turn exactly corresponding with those first observed. And beyond these we continue on over quite a number of additional layers equally distinct, in place of the molten mass that we first observed. A curve in the stream causes the rock to disappear under alluvial matter for some rods, when we again come upon it, and it soon after presents the sparry mass, which is No. 13 § 214.

One or two interesting facts shown at this plication merit a passing notice. An inspection of the illustration shows that the arch here formed by the strata is not vertical, but its apex is crowded strongly over to the west, thus giving an eastern dip to all the layers, and thus also causing the west face of the hill here to be precipitous and appears more like a fracture and uplift than a fold. It further appears that the

army was lying encamped at Whitehall, a man named Gilder busied himself in driving off to the enemy's camp, cattle belonging to the whigs of this vicinity, secreting himself the while in this unfrequented ravine. At length his lurking place was discovered by one who had suffered from his depredations; who came upon him with his loaded gun, and taking deliberate aim, shot him dead as he was clambering up the rocks to escape.

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limestone was not solidified at the time of this plication, inasmuch as the beds on the left side of the axis are less than half the thickness that the corresponding beds on the right are; as though they had yielded in some degree to the greater pressure which they had to sustain, and had hereby been compressed and attenuated. The distance from the axis to the slate may be forty feet; whilst to the right thrice that thickness of the bed is passed over without reaching the slate on the east.

Further evidence that this Bald mountain range of hills is a fold and not a fracture and uplift, I think is presented at another locality. Between the Mettowee river and Batten-kill, another stream of water breaks through this range so as to expose it to view nearly down to its base. This is East creek in Hartford, along the side of which runs the road from Hartford village to the so-called Log village. Between these places, upon the roadside, is exposed a considerable mass of sparry limestone identical in its appearance with that at Bald mountain. It would seem that the same cause that brought up this limestone must have been that which elevated the hills here also. Yet it presents itself at the east base of the range instead of being out upon a line with their west base, where it should be if it had been brought up by a fracture and uplift.

In view of all the facts, therefore, scarcely a doubt can remain that this long range of hills that skirts the Hudson river valley upon its east side has been formed by a plication of the strata, and not a dislocation, as has all along been the current supposition. And that further evidence of this has been detected, in the counties south of here, we are quite confident.

222. *Obscurity of such folds when occurring in the Slates.*—Below the falls at the head of Gilder's hollow, the Mettowee holds a western course, passing over various beds of shale and silicious slate at right angles with the line of their strike, for a distance of 40 rods or more, and almost reaches the main range of Chazy limestone which reposes on the sandstones. It is obvious that an anticlinal axis must exist in this range of slate; and careful search will detect it, so faintly marked, however, that it would be passed over unobserved a thousand times unless attention was turned directly to this subject. It will be found on the south side of the stream, coming out from under the alluvial soil of the bank, and may be traced a few yards in the level bed of the stream, when all appearances of it become lost. This fact is important, as showing that similar axes may occur, and our slates be every where doubled and plicated, without our being able to detect it.

223. *Strata and fossils of the north-west corner of Granville.*—This north-west corner of the town of Granville, I regard as decidedly the

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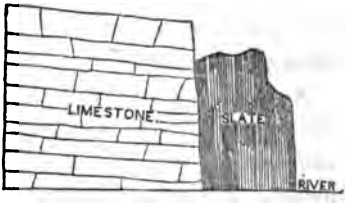
most interesting locality to the geologist that occurs in this county. Here more distinctly than in any other place the relations of the New York system with the Taconic rocks are exhibited. From Comstock's landing and along the south line of the town of Whitehall, as we travel east, we pass from the Gneiss, over the Potsdam and calciferous sandstones, and the Chazy limestone, which last extends to Gilder's hollow, forming the west side of this narrow and rock-bounded defile. Below the lowest falls on the Mettowee and some two miles from Granville academy, the river in running north has its west bank for quite a distance formed of broad, flat tables of Chazy limestone, dipping east at an angle of ten or fifteen degrees, while the opposite, east bank of the stream is composed of black shale and slate.

A mile north of here a brook comes in from the west, and here a most singular conjunction of the limestone and slate is seen in a precipice some eighty feet in height, upon the north side of this rivulet. The annexed cut gives a view of this precipice, and shows how broken and thrown out of order the strata at this place are; the limestone in even layers dipping slightly to the east, abruptly terminates, and resting against it with a nearly vertical dip we see the slate.



Precipice three miles north-east of Granville Academy.

We thus trace the Chazy limestone to its eastern margin at the Mettowee river, when its dip sends it under the slate. Crossing the river at the lowest falls and ascending the steep hill which forms the east side of Gilder's hollow, we pass over slate nearly up to the summit of the hill, and here at a distance of 30 or 40 rods from where we left the limestone we come upon it again with a dip and trend conformable to the slate. And this is the range in which the plication already described occurs, and which we deem to be nothing more than a prolongation of the Bald mountain limestone. We trace it out thus particularly in order to show how the Bald mountain limestone is connected with the equivocal limestones of the New-York system. And where we thus come upon it here, we meet with the richest locality of fossils that we have been able to discover in the county. The weathered surface of the limestone abounds with the *Maclurea magna*, this fossil here occurring where it is nearly or quite in contact with the slate, and consequently (the rocks being overturned) in the upper part of the limestone instead of the lower part, where it commonly is found. Associated with it here was found a tapering shell, exhibiting six volutions, and

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which I deem to be the *Murchisonia gracilis*. And slightly to the south from this spot, a number of the Trenton limestone fossils were found, the names of which will be met with in our list, (§ 226). These facts show that this limestone is the full equivalent of the Chazy, Birdseye and Trenton limestone, and that it is impossible here to separate and speak of these as distinct strata.

224. *Conclusions as to the Bald mountain and the Sparry limestones.* In conclusion, then, of this branch of our subject, we may state, that we regard the Sparry limestone as a stratum directly overlying the Chazy-Trenton limestone of this county, and that we have both the Sparry limestone and the stratum beneath it, at Bald mountain and its immediate vicinity. As no preceding writer has regarded the checkered masses of Bald mountain as being properly the Sparry limestone, I may repeat, that the Taconic sandstone is so associated with the limestones about these hills as to show most conclusively to my mind that the rock there must be the same which this sandstone similarly attends through all the district east of these hills.

At none of the many places where the sparry limestone appears, to the east of the Bald mountain range, has the elevatory movement been sufficient to bring up to view anything more than this rock, that I am aware. Hence the necessity of treating it as a distinct stratum.

225. *Composition of these limestones.*—Analyses have been made for this survey, by Mr. Salisbury, of the Bald mountain limestone, the Galesville hydraulic (sparry) limestone, and the Sparry limestone of Jackson, from the vicinity of Dobbins' lime-kiln, this being upon the eastern range, (vide § 212.) They were respectively found to contain as follows:

	Bald mt.	Galesville.	Jackson.
Carbonic acid,	42.32	33.00	36.96
Lime,	54.48	42.28	47.54
Magnesia,	0.44	0.26	1.76
Silica,	0.44	20.04	3.16
Alumina and Per-ox. of Iron,	0.36	0.88	1.96
Potash,	0.36	0.39	0.36
Soda,	0.96	1.08	2.64
Chlorine,	0.32	0.44	0.36
Organic matter,	0.22	0.28	4.05

For the purpose of comparison with the above, I may add, that the hydraulic limestone near Newburgh, Ulster county, according to Dr. L. C. Beck's analysis, contains carb. acid 34.20, lime 25.50, magnesia 12.35, silica 15.37, alumina 9.13, per-oxide of iron 2.25.

The sparry limestone of Hoosic, 15 miles south of Dobbins' lime-kiln

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and in the same range, contains, according to Dr. Emmons' analysis, carbonate of lime 82.14, silica 11.50, per-oxide of iron and alumina 6.36.

The black marble of Isle la Motte, allied geologically to the Bald mountain limestone, but more closely related to the Trenton limestone of Kingsbury and Glen's Falls, contains, according to Prof. Adams' second report on the Geological survey of Vermont, carb. of lime 87.94, carb. of magnesia 4.56, silica 4.80, alumina and iron 2.60.

226. *Economical uses.*—Slabs of the Chazy limestone have been got out, both in north-west Granville and in Whitehall, which took on a fine polish and showed that the stone here was suitable for being worked as a marble. There is every probability that portions of the Sparry limestone are sufficiently compact to form a good Egyptian marble, and that the stratum below it might furnish the same dove-colored marble that is obtained from it in other places. But this is a branch of business that has never been pursued anywhere within the county.

Though used for walls, buildings, &c., in the neighborhoods where they occur, it is for burning into quicklime that these rocks are especially valuable. Kilns have been built, and lime of a fair quality obtained at numerous places in the county, where the business has only been pursued temporarily. The proportion of silex which the Sparry limestone commonly contains, is too great to adapt it for good quicklime, and too small to render it valuable for hydraulic cement; for fertilizers of the soil, however, they are well adapted, and will no doubt be much resorted to at a future day.

227. *Bald Mountain Lime-kilns.*—The following lime-kilns are at present in operation upon the Bald mountain uplift of limestone, in the west part of Greenwich and the north part of Easton:

Charles Wright, at Bald mountain,	owns	3 kilns.
Charles Wright, Jr., " " "		1
—— Gramby, south of Bald mt., "		3, one a draw-kiln.
—— Robinson, " " "		1
William Green, " " "		1
John P. Tefft, " " "		1
John Potter, " " "		1
Reuben Gamby, at Galesville, "		1, limestone bro't from Bald mt.
Frederick Gale, ½ mile south Galesville,		1, making hydraulic cement.
James Watson, " " "		1 " " "
Francis Toby, at Toby's mountain,		1
—— Mains, " "		1
		16

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All these, except the four last, use the blue limestone (checked in places with cals. spar) of Bald mountain and its outlying masses. The quality of the limestone here was first ascertained soon after the close of the revolutionary war; by breaking it into small fragments, and placing these upon the top of a pile of logs, which on burning produced a sufficient heat to calcine it, for a building that was erecting at Schuylerville. The first kiln was put up about the year 1790, by Cornelius Dunham. Gardner Thayer and Samuel Heath, did a most extensive business here for many years, and made this lime well known to our city markets, where it has long enjoyed a reputation scarcely rivalled by that from any other locality. Though other places furnish an article equally as good for mortar for laying brick and stone, and for the ordinary plaistering of buildings, for the "hard-finish" of walls, and for white-washing, the Bald mountain lime is esteemed superior to any other, in consequence of its snowy whiteness. Hence, although it requires to be carted some three and four miles to the canal (at Fort Miller bridge), it is in such demand in Albany and New York as, notwithstanding this drawback, to compete with kilns in other places situated immediately on the canal; and an immense amount is sent to market yearly, in addition to supplying the wants of all the adjacent country. The draw-kiln of Mr. Gamby turns out 100 bushels daily, except during the winter season, when its operations are suspended. Fuel has become so scarce in the vicinity of these kilns, that it is now frequently drawed hither in quantities from a distance of ten and twelve miles. The draw-kilns are so much more economical as regards fuel, that it is singular that only one has as yet been here erected. All the others are of the old construction, requiring the fire to go out in order to empty the *kiln*. That of C. Wright, jr., furnishes 800 bushels of lime at each burning, and is filled and burned once a fortnight during the period of canal navigation. In the winter it only burns for meeting the demands of the vicinity, and for being carried by sleighs to Troy, thirty miles distant. The business at several of the kilns is less diligently pursued than at this, and the annual average of the whole is somewhat less. The estimate is, that about 60,000 bushels of lime are annually yielded by these Bald mountain kilns. The supply of limestone here may be regarded as inexhaustible, and the amount furnished can be increased to any quantity which the demands of the market may require.

The Toby mountain lime, though from the same range of rock, and but three or four miles distant, does not possess the snowy whiteness of the Bald mountain lime, and is less esteemed for the uses which give this its high character. In all other respects, however, it is equally as good.

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228. *Galesville Hydraulic Cement.*—Between Bald mountain and Toby's mountain occurs an uplift, geologically identical with those, where the rock contains such a per centage of silex, as to form an excellent hydraulic cement; and here two kilns, as above mentioned, are erected. This cement is probably as good, but no better than that obtained in other places. A mason who has worked much with Newburgh cement, informs me that he regards the two on a par as to their value; the Galesville cement being preferable for work in this vicinity, because it can be procured more new and fresh from the mill. Cement differs from lime in not slakeing, swelling, and crumbling to a powder when water is applied to it, and hence it requires to be ground. When fresh ground, some heat is perceptible when water is applied to it, but this is not observable when it is a few months old. When it is eight or twelve months old, it does not harden as rapidly, but eventually becomes as hard as the newly ground; and barrelled and kept dry, it may probably be preserved for years; but our masons always prefer that which is newly ground. The ground cement is delivered at the Galesville mills at twenty-five cents per bushel, which is the same price for which it is delivered at all the limekilns hereabouts, this having been the standing price ever since its burning was commenced.

Hydraulic cement is coming more and more into use every year in this vicinity, for cisterns, for coating the bottoms and sides of cellars, thus rendering them rat-proof and water-proof; for pipes for conducting water, and a variety of similar purposes. One experiment has occurred to my notice, where it was used for forming a front walk to a house; but in the course of two or three years it cracked and crumbled to fragments. The frosts of our winters forbid its use in all situations where it is exposed to the weather. In this county and the adjoining Vermont towns, two operatives the past year (1849) put in about 100 cisterns, covered many cellar-bottoms and sides, and on five farms laid 280 rods of cement pipe, finding the materials and doing the entire work themselves, and charging seventy-five cents per rod for cement pipe, and ten to twenty dollars for cisterns, as the size is twelve or thirty hogsheads. All the cisterns hereabouts are now being constructed in the shape of truncated cones, and of cement alone for the bottoms and sides, this being plaistered directly upon the earth, and the whole cistern covered to a depth of two feet to insure against frost. Several such within my knowledge are six or eight years old, and none have been known to crack or require any repairing.

229. *Jackson lime-kiln.*—This is the only one in the county to the east of the Bald mountain range of hills. It has recently been erected by Alex. Dobbin, and is situated on the west side of the Big pond, where

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lime was formerly burned in considerable quantities, which had the reputation in the vicinity of making a stronger "mortar" than any other lime; and it seems not improbable that the small percentage of silex which the analysis shows it to contain, by assimilating it somewhat to hydraulic cement may justify this reputation.

230. *Hartford and Whitehall lime-kilns.*—The burning of lime has long been pursued in the west part of Hartford, along a ridge of Chazy limestone which here forms the east boundary of the valley of Wood creek. The kilns now in operation along this ridge are, Campbell's within the border of Kingsbury, Goodale's, Graham's, H. Murrill's, Col. D. M. Brown's and S. Murrill's. These only burn what is called for in the vicinity; none is exported. About 1000 bushels annually is the average produce of each of these kilns.

In the southeast part of the town of Whitehall, along the west side of the Bald mountain range of hills the burning of lime has of late years been engaged in, and with such success as to cause a gradual increase of the business, and at this date five kilns are here in operation. Three of these belong to Orange Noble and brother, the other *two to* Ambrose Baldwin and Levi Valkenburgh. The lime is of an excellent quality, and is carried in large quantities to Whitehall five and six miles distant, for the supply of that village and also for exportation.

Two lime-kilns are also in operation in the town of Putnam, owned by Robert Simpson and William Hutton. The limestone of the former resembles gypsum in appearance and some have ground it and used it upon land. Grains of graphite occur in it, which leave black streaks upon walls where the plaister has been made with this lime. These kilns only supply their immediate neighbourhoods.

Our remarks upon the use of lime as a fertilizer of land are deferred to a subsequent part of this work.

231. MAGNESIAN SLATE.—In travelling east after we have passed all the most conspicuous exposures of the rocks last considered, we come upon this range of slate, apparently reposing directly upon the white limestone next to be spoken of. Hence it is not inappropriate to place it in this order, although we do not deem its geological place to be beneath the sparry limestone. We regard it rather as the underlying portion of the Taconic slate, and the equivalent, probably, of the black, pyritous, shaly mass which upon the west side of this district we find accompanying and alternating with the Taconic sandstone. Its true geological place we suppose to be where Nos. 4, 6, 8 and 11 occur in the table § 214. But on the east or opposite side of this district it presents itself as a green or light greenish gray slate, so soft that it may in

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many places be scratched with the finger nail and carved with a knife, like chlorite. The colour of its pebbles has without doubt given name to Green river, a branch of the Batten-kill from the town of Sandgate. It is often profusely permeated with veins of milky quartz, which mineral has run through it in every direction like water soaked into a sponge. The rock itself is so soft that it crumbles and melts away with but slight attrition. Hence boulders of it are never found in our soils. But the white quartz with which it is veined, containing in its cavities the chlorite and slate of this stratum, is scattered in abundance through the soils of the county. And those who regard these rocks as metamorphic, will deem that the silex that is elsewhere diffused through the slates has here been melted and run together, thus forming these veins, and leaving the remainder of the rock so extremely soft as we find it. The same fact that has been noticed in counties south of this is strikingly exhibited here also, namely, where it joins the limestone it presents an even and undisturbed lamination, whilst on its west side, where it approaches the Taconic slate it is undulated, twisted and contorted often in a most astonishing manner. As it occupies but a limited space in the southeastern part of the county, a further notice of it is deemed unnecessary.

232. *Granular limestone.*—This white limestone which is also designated Stockbridge limestone, crystalline limestone, &c., and which is known in this district under the name of Dorset marble, Arlington stone, &c., only touches upon the extreme southeastern corner of the county the length of a mile, the main part of the range passing to the east of us. It furnishes most of the marble used in the county, and the amount which is quarried along our eastern borders is immense, and is annually increasing. Large quantities from the Dorset quarries have for many years been taken across this county to the Champlain canal, a distance of some 20 miles of land transportation, whence much of it goes by way of the Erie canal to Cleveland, Detroit, and other lake ports. The opening of the Troy and Rutland railroad will give these and other quarries farther north facilities of transportation in this direction greatly beyond what they have hitherto enjoyed. A brown specimen of the Dorset marble, according to an analysis given in Prof. Adams's Geological Report already referred to, contained carbonate of lime 85.18, carbonate of magnesia 13.11, alumina and iron 1.79, silica 1.49.

233. Granular quartz.—Though this rock is nowhere present within our county, a notice of it is important, connected as it is with our strata and distributed as its fragments everywhere are in the form of pebbles and cobble-stones through our drift or gravelly soils. It appears all along the east margin of the white limestone and upon the west side of

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the main range of the Green mountains. Its color is light brown or white and it sometimes appears bedded in even layers, in cliffs and precipices analogous to those of the Potsdam sandstone, from which however, it differs notably by the vitreous, glass-like or greasy lustre which its surface presents, and which character is so striking that where the boulders of both rocks are blended together in the soil, we seldom meet with a specimen which on the slightest glance at its freshly fractured surface we cannot refer with full confidence to the one stratum or the other as the case may be. But how perfectly the application of heat alters the dull, earthy appearance of the Potsdam sandstone to the shining crystalline aspect of this rock, we had an opportunity of seeing finely illustrated where the Potsdam was being blasted at Flat rock in grading the Whitehall railroad (§ 185). Merely the sudden and evanescent heat that was occasioned by the firing of the powder, vitrified the sandstone contiguous to it, to a distance of some inches, and changed it in appearance to the most perfectly characterised granular quartz.

It will be observed that in our Geological section we have represented these rocks with a dip the reverse of that which, from accounts, they appear to possess in most places. But both the Gneiss in the neighborhood of the Whitehall turnpike gate, and the limestones across the plains of Manchester and Dorset exhibit the western dip which we have here given them, the angle at several observed points being 20° to 30°. And in all cases, it will be conceded that this is their true position, however much the appearances on the surface may be to the contrary.

234. *The Green mountains have been moved towards Hudson river.*—To make this subject more plain and intelligible to the general reader, in conclusion of this branch of our theme it may be observed, that all the geological facts exhibited in this district concur to indicate that when the rocks here were first deposited, the point that now forms the Green mountains was more than double the distance from Hudson river that it now is. Subsequently a period of great disturbance and disruption of the earth occurred, when it was everywhere convulsed and torn, as if lashed and goaded by a thousand earthquakes simultaneously in full play. At that time the Hudson river and the Green mountains were crowded towards each other, causing the rocks, that had previously lain in regular, even, horizontal beds, to be crushed and ground together and folded over each other in the most promiscuous and confused mannner. Some idea of the effect that would be produced by such a convulsion may be formed by observing the mode in which the ice in our rivers breaks up in the spring of the year,—when a mass from above becomes so loosened as to commence moving down the

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stream against a mass that is still firm, causing portion after portion of the thick-ribbed solid to crack and yield before the tremendous pressure, throwing huge massive blocks into every different posture and making a perfect chaos where a half hour before, all was regular and apparently of enduring strength and firmness. Analogous to this seems to have been the operation of that cause that was once in action, breaking asunder and overturning the strata of this district, causing mountains and hills to shoot up and vallies to close together here and open out there, and producing among our strata such confusion as geologists for centuries may study, without being able to unravel and explain the phenomena presented at some of its localities.

235. *Minerals.*—For the following catalogue of the minerals of this county, I am under obligations to a friend whose acquaintance with this branch of science, and whose opportunities for thoroughly examining some parts of the county with which I am less familiar, enable him to do better justice to the subject than I felt myself capable of. By his desire, and to make this catalogue as complete as our present knowledge enables to be done, a few intercalations are made, which are indicated by brackets.

CATALOGUE OF THE MINERALS OF WASHINGTON COUNTY.

By E. H. Newton, A. M.

Metallic Minerals.

Magnetic Iron Ore. Deposites of this valuable oxide of iron occur in veins of several feet in thickness, which have been opened and explored to some extent upon a mountain north of the village of Fort Ann. Portions of the veins are highly charged with the ore, of feeble lustre and distinctly magnetic; while other ranges are mixed with a variety of other minerals, viz: quartz, colophonite, coccolite and hornblende, furnishing interesting specimens for the cabinet of the naturalist. Westerly from these mines are other deposits of a similar variety of ore, in the vicinity of Mount Hope furnace.

Magnetic Iron Sand, is found upon the beach of the Hudson river, and may be collected in considerable quantities, furnishing a good article for sand boxes. It is also found disseminated in the beds of sand in the vicinity of Sandy Hill which can be attested by the magnet.

[*Specular Iron Ore.* A narrow vein, of the Red Hematite variety, occurs in granite, near the summit of Mt. Defiance, for specimens of which I am indebted to Dr. R. H. Mack. Though this locality is

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slightly beyond the bounds of this county it is quite probable that other veins occur in the same vicinity, within our borders.

Jaspery Iron. This variety also occurs at the same locality. *Beck.*]

Limonite. This valuable ore of the oxide of iron is found abundant at the head of South Bay. It is also found two miles south-easterly from Whitehall, and also in the towns of White-creek, Jackson and Argyle.

Iron Pyrites. Sulphuret of Iron, of a yellow or white metallic appearance, of litle value, but often mistaken for the precious metal, is more or less diffused through the rock formation of the county, often in cubical-shaped crystals. It also occurs in the soil in round or roundish balls, radiating from a nucleus at the center. They probably have been liberated from their former place of deposit by the disintegration of the slate rocks. By some these balls are called thunderbolts, from the supposition that they have descended with the lightning when it has struck the earth. When found in sufficient quantities pyrites is used in the manufacture of copperas.

[*Copperas.*—This salt frequently occurs as an effloresced incrustation upon our slate rocks, where these are charged with pyrites. The lodge of slate by the roadside, half way between Fort Miller and Reid's Spring, may often be observed whitened in spots and patches with this salt in dry weather.

Cacoxenite, is associated with the Specular Iron Ore on Mount Defiance. *Beck.*]

Galena, or Sulphuret of Lead, is found in a lime-rock formation easterly from Post's Corners in White creek. This mine has been explored and a quantity of the ore smelted and metallic lead obtained. But not yielding as great a profit as was anticipated the enterprise has been abandoned.

Zinc blende, or Sulphuret of Zinc, has been found with the galena at the same locality.

[*Native Copper* "has been found in Washington county, but the precise locality is as yet unkown." *Beck.*

Copper ore, was observed in small quantity in the gneiss rocks in Putnam near the ferry. *Mather*, Report of 1841, p. 107.]

Green Malachite.—This has been discovered in blue argillite, in the north part of Hebron, a few rods west from the turnpike.

EARTHY MINERALS.

Quartz.—[Rock crystals, commonly called "diamonds," are common throughout the county, but mostly small. Seams in the Taconic sandstone are often most beautifully frosted over with them. A perfect

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crystal, nearly hyaline, 5¼ inches in length and 3 in breadth, I found many years ago in the slates of Rensselaer county.

Common quartz, milky quartz, greasy quartz, yellow quartz, rose quartz, and other varieties are extensively distributed through both the rocks and the boulders of the county.

Ferruginous quartz, (spongiform) massive, both yellow and red, is abundant everywhere. A specimen of the yellow variety analysed for this survey by Mr. Salisbury, was found to contain 90.74 silica and 5.56 per oxide of iron.

Hornstone, a mineral from which the Indians usually manufactured the heads of their arrows, spears, and other weapons, occurs in the limestone formation and in boulders.

Silicious argillite, resembling jasper, but less compact, and having a foliated or laminated structure, is more common.

Serpentine.—In boulders. [Also, in white limestone, at Shelving Rock in Fort Ann, perhaps sufficiently abundant to possess value as a marble. *Beck.*

Steatite.—This variety is associated with the preceding, at Shelving Rock. *Beck.*

Talc, indurated, in Talcose slate near the state line, in White creek, Jackson and Salem. Abundant.

Chlorite, fine grained, of a greenish hue, in boulders of milky quartz in White creek, [and in the same situation in Salem.

Pyroxene, foliated and lamellar, in Putnam, on the shore of Lake George, two miles south of Ticonderoga, and also at Shelving Rock. *Beck.* In a cliff of white limestone, beside the turnpike, one and a half miles north of Fort Ann village. *Mather.*

Sahlite, grayish-white and green, of a pearly-metallic lustre, on Mt. Defiance. *Beck.* Also at Comstock's landing.

Cocolite, in the limestone cliff at Fort Ann, associated with plumbago, hornblende and pyroxene.]

Hornblende, granular and crystalline, at the iron mines on Fort Ann mountain.

[Tremolite, in small quantities, associated with the serpentine at Shelving Rock. *Beck.*

Hypersthene.—In the north part of Putnam on the Lake George shore. *Beck.*

Garnet, in dodecahedral crystals in boulders of granite. A variety of granular and massive garnet is found on Fort Ann mountain.

Colophonite, in the iron ore beds, Fort Ann.

Melanite, do.

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Pyrope, with massive garnet, Fort Ann mountain. [Also at Comstock's landing.

Essonite, at Comstock's landing.

Scapolite, not uncommon in the white crystalline limestone of Fort Ann. *Mather.*

Felspar, occurs throughout the primitive range of the county.

Adularia, is noticed by Dr. Beck as associated with pyroxene and mica a mile south of Black mountain on Lake George.

Porcelain clay, no doubt occurs in the same range.]

Labradorite, in boulders [and probably in place in the north part of the county.

Albite.—I am informed by Dr. Emmons that it was in the hill in the north-west suburbs of Middle Granville that the beautiful white and transparent, and often twin crystals, of this mineral were obtained. Minute crystals of the same have often been found in Salem, in the hills north of Fitch's point, associated with rock crystal.

Epidote, in small, yellow, translucent crystals, on the shore of Lake George in the north part of Putnam. *Beck.*]

Tourmaline, in gigantic crystals, in Dresden. [They may well be termed gigantic. Such crystals may be seen on ascending the mountain west of the mouth of South Bay. Acicular crystals of tourmaline occur in quartz, in Sunderland, Vt., whence they are sometimes brought in boulders down the Batten-kill to Salem.

Pitchstone, in boulders of trap, Salem.

Mica, occurs sparingly throughout the granitic rocks of Fort Ann, Dresden, and Putnam.

ALKALINE-EARTHY MINERALS.

Calcarerous Spar, is found at Bald mountain, and through the county generally, where there are deposits of limestone. One of the best localities known in the county is in the bed of the Hudson river at Sandy Hill, where it is abundant in white rhombic crystals. Lenticular crystals also occur at the same locality.

Carbonate of Lime.—Marble. White or statuary marble underlies the south-east corner of White creek. Dove colored marble might be obtained from the limestones of Greenwich, Granville, &c. Black marble in Kingsbury.

Calcarerous tufa, is found near springs and in caverns in the vicinity of Whitehall; also in the banks of the Hudson. [A fine locality is at Dead-man's point, above Fort Edward.

Stalactites and stalagmites, in the same caverns.

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Agaric mineral, at the foot of Fort Ann mountain, near the turnpike-road.

Satin spar, in red argillite, at the copper-mine in Hebron.

Shell-marl, highly charged with lime and containing fluviale shells is found on the farm of Geo. McGeoch in Jackson; also in Argyle, and probably other beds exist. The lime formations of Washington county are somewhat extensive. The sparry limestone of Eaton is found in considerable quantity, especially in Cambridge and Jackson, where it has been quarried, furnishing blocks valuable for the foundation of buildings. Hydraulic limestone is abundant in Easton, and extensively manufactured. Calciferous sandstone [vide § 214] with rock crystals and calcareous incrustations occurs on the farm of William Stevenson jr., in Jackson.

Muriate of lime in solution, forming the "hard water" of some of our wells.

Epsom salt, occurs in dry weather as a white efflorescence upon the bare clay banks in Easton, the same as at the well known locality along the new turnpike three and four miles north of Lansingburgh.

COMBUSTIBLES AND GASES.

Sulphur, I have sometimes found, dusted in patches upon the surface of our slates, having been formed by the decomposition of iron pyrites.

Graphite, foliated and granular, is common in the rocks of Putnam, Dresden and Fort Ann. A view of this mineral occurs in limestone, little over a mile from Fort Ann village, on the road to Whitehall.

Peat.—Localities will be found fully specified in another part of this work.

The gaseous minerals are so ubiquitous, that a full enumeration in local catalogues is scarcely called for. We merely observe, therefore, that

Sulphuretted Hydrogen is evolved from several of our mineral springs, which see.

Phosphuretted Hydrogen, forming the "jack-o'-lantern" light about marshes is much less frequently seen now than it was formerly.

Nitrogen issues copiously from the well-known spring in Hoosic, near the south-east corner of the county, and probably also within the county, though it has never been discovered.

Carbonic Acid gas collects everywhere in our wells, and a well should never be entered till it is ascertained that a lighted candle will burn in it.]

236. *Fossils.*—At an earlier period of my life I had at different times made thorough explorations of the limestone at Bald mountain and the

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slates east of it, to detect fossils in them, but in vain. If the flexuous fucoid, now known to be so common, occurred to my notice, it was only deemed a discoloration caused by the roots of trees growing in contact with the slate. To the Rev. E. H. Newton belongs the credit of having first recognized this as being a fossil, and of having thus made the first discovery of this kind within the county. In the progress of the late Geological survey, when Prof. Mather visited this district, this fossil was pointed out to him, and the first published notice of it appeared in the Geological report of 1841. In the same report, the fact is stated that fucoidal impressions occur in the Potsdam sandstone of this county. With these exceptions, I believe all the unequivocal fossils as yet known to exist in the county were first detected by myself, and those peculiar to the county have been figured and described, with but one further exception, from specimens furnished from my collection. Prof. Hall credits six species to this county, but aided by his invaluable volume (forming part of the State Natural History series) we are able to add considerably to this number, and furnish such evidence as to the age particularly of the limestones of this county as has not hitherto been communicated to the public.

FOSSILS OF WASHINGTON COUNTY.

PLANTS.

Palæophycus tubularis, Hall. It must be regarded as this species which occurs in the fucoidal layers between the Potsdam and calciferous sandstone on the west side of Skene's mountain, and is perceptible in some of the flagging stones in the side-walks of the village of Whitehall. I have also observed it in Fort Ann. The stones, though numerous are much broken and so obscure that they furnish no very distinct marks by which to identify the species.

Palæophycus virgatus, Hall. In the slates of Greenwich and Salem.

Palæophycus rectus, new species. Elongated linear, unbranching marks, two or three lines in breadth, are sometimes met with in the slates of Salem, which I should refer to the species *simplex* of Prof. Hall, but for their geological situation. Next after the following it appears to be the most common fossil in the slates of Salem.

Buthotrephis? flexuosa, Emmons. This is abundant in Hartford, at the quarry two miles north-east of the village, and occurs in the slate-rock everywhere from thence to the south line of the county, appearing like flexuous, branching marks painted upon the stone, of a black or at least a darker shade than its general color.

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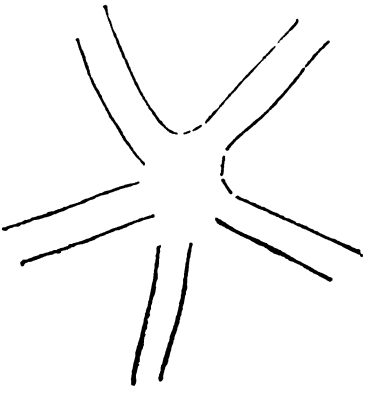
Buthotrephis? Asterioides, new species. This has been observed only upon a single slab now standing in the quarry in the west part of the village. On this slab, in fifteen or twenty places, faint discolorations occur, the outlines of which are accurately represented in the annexed figure. Neither the axillæ nor the terminations of the branches are distinct; enough, however, is seen to show that this is a relict very different from any that has hitherto been noticed, and so well characterised that the figure here given will enable any one to recognize it.



Buthotrephis? Asterioides.

Phytopsis cellulosum, Hall. East Fort Ann, on Dr. Rice's farm, south of his dwelling, below the last falls of the Mettowee on the west bank of the stream, obscure at both localities, but near the *Maclura magna*, which circumstance guides me more, to the name, than any marks which the fossils themselves show.

ZOOPHYTES.

Graptolithus pristis, Hisinger. One of the most abundant localities of this species that is anywhere known, is at Baker's falls, Sandy-hill. "Here a thickness of thirty feet or more, is so filled with these impressions, that the thinnest layer can scarcely be split off, without exposing a surface almost covered with them." Some old specimens in my cabinet, believed to have been taken in the neighborhood of Fort Miller, also abound in these impressions. They also occur in Easton, in the bed of the brook which enters the Hudson a mile above Van Buren's ferry. That this fossil which occurs so common all through the Utica and Hudson river slates from Lake Ontario out on to the very borders of the Taconic district, should there suddenly disappear and not a vestige of it to be anywhere detected in the Taconic slates, is a most remarkable circumstance, if we regard these rocks as cotemporaneous. It is difficult to conceive how any metamorphic agency that could produce such a result should leave, so distinct as they are, the graptolites at Hoosic, and the flexuous fucoid through all the south-eastern half of this county.

Graptolithus secalinus, Eaton. This is the leaf-like impression that is so common upon particular layers of the roofing slate at the quarries

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in Hoosic. Professor Hall associates with these some of the more expanded graptolites from the locality at Baker's falls, and seems inclined to regard the whole as only a variety of the preceding species. My Hoosic specimens show that the bases of the stipes are sometimes less than a line in breadth, but the same stipes are often prolonged to where they become double this breadth. The breadth commonly is from nearly two to nearly three lines; and I fear that any theorizing which will make this graptolite identical with the *pristis*, will be liable to strike from our systems a host of the species now recognized.

Chætetes Lycoperdon, Say. A single specimen found north of the falls below North Granville (vide § 223) is well marked, exhibiting the radiating tubes, with some of these tubes distinctly traversed by diaphragms. No doubt can therefore be entertained as to the identity of the species. A half dozen other specimens from the same locality are too obscure to be accurately determined had they not been with the first.

Streptoplasma profunda, Hall. Several specimens of this species were obtained at the same locality.

CRINOIDEANS.

Schizocrinus nodosus, Hall. Broken fragments of the column of this encrinite (commonly called "spinning wheels" from their appearance where a transverse section is exposed) are common at the locality last specified. The weathered surface of the limestone is sometimes here seen thickly covered with the debris of this species standing out in relief and resembling fragmentary stems of plants interspersed with rings and wheels of all sizes from that of a pin up to the eighth of an inch or more in diameter.

Heterocrinus heterodactylus, Hall. Specimens believed to be from the neighborhood of Fort Miller contain this species. It occurs in the slate at the upper end of the main street of the village of Stillwater, and will without doubt be found at different places along the western border of this county.

SHELLS.

Leptæna alternata, Conrad. At the locality already specified in the north-west corner of the town of Granville.

Leptæna deltoidea, Conrad. At the same locality.

Orthis testudinaria, Dalman. Two miles west of North Granville, on the road to Dewey's bridge. This species, with others of this genus, is also common at the same locality where the preceding occur.

Ophileta complanata, Vanuxem.—A pebble of worn sandstone that had been split asunder was found in the soil in Hartford and presented

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to me by Mr. Ingalsbe, which exhibits on its fresh surface the coil of a shell so closely like that represented on page 11 of Prof. Hall's volume, that though nearly double its size, I have no doubt it is the same fossil.

Maclurea magna, Lesener. This characteristic fossil of the Chazy limestone occurs abundantly in the north-west part of Granville, in the same uplift and but slightly north from the spot where several species already named were obtained. The weathered surface of the rock over a half acre or more in extent, everywhere shows the relics of this mollusk, corresponding with several of the figures of it given by Prof. Hall, and of different sizes, from young individuals less than a half inch in diameter, up to much larger ones than any of those represented in the figures.

Murchisonia gracilis, Hall. Casts showing two or three volutions, probably of this species, are occasionally found near the preceding in the north-west part of Granville. Two specimens only have been obtained, having the whole number of volutions, and of these, one is a heterostrophe.

CRUSTACEANS.

Calymene Beckii, Green, Hall. *Atops trilineatus*, Emmons. The history of the species or variety belonging to this county is somewhat interesting. No vestige of a trilobite had ever been detected in the Taconic rocks, and this fact was one strong ground for regarding these strata as distinct from the New-York system. But in the summer of 1844, most unexpectedly I came upon these fossils in the slate by the road side, a few rods south of Reynold's inn, quite within what had been regarded as the western border of the Taconic district. The specimens were forwarded to my friend Dr. Emmons, who soon afterwards published figures and an account of them. The correctness of his views was controverted, and at a meeting of the American association of Naturalists, this subject was referred to a committee for examination. Mr. Haldeman from this committee presented a report, September 1847, confirming the correctness of Dr. Emmons' views. The volume of Mr. Hall has since appeared, in which he decidedly dissents from his predecessors. I have never made this department of science a subject of such careful study as to entitle my opinion to any weight upon so nice a point as this, and I therefore leave it where I find it.

Olenus Asaphoides, Emmons. At Reynold's inn, with the preceding. Several days labor has been bestowed at this locality, yet only about a dozen specimens of any value have been obtained.

Trinucleus concentrica, Eaton. Four fragmentary specimens of the buckler of this trilobite, which is so common at Glen's falls, were found

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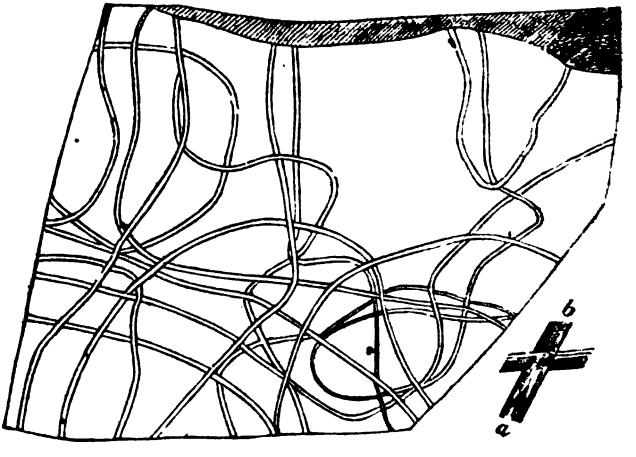
in the north-west corner of Granville; and, as already related, one specimen has been obtained from Toby's mountain, in Easton.

FOSSIL WORM TRACKS.

Slightly elevated upon the surface of the slate in two places at McArthur's quarry in Jackson, vermiform lines were discovered by Dr. Emmons, different from anything that had previously been observed. Supposing them to be the relics of some marine worm they were figured and described by him under the name of *Gordia marina*. Prof. Hall doubts whether these are organic, and is inclined to regard them as casts of the tracks made by some molluscous worm. A discovery which I have made leaves no doubt that Mr. Hall is correct in this view. Upon a layer of the slate at Middle Granville occur grooved vermiform marks, from one of the specimens of which, the accompanying figure was drawn, though not scrupulously accurate in all the crossing of the tracks. The smooth mud in the bottom of our pools of water may frequently be seen traversed everywhere by marks corresponding to these, and which may be produced by any one of several aquatic worms common in our country. These furrows in the slate



Helminthoidichnites tenuis.

when examined with a magnifier not only furnish the most convincing evidence of their cause, but even show, frequently, the direction in which the worm that formed them was crawling. The edges of the grooves are slightly elevated. The magnified track, *a*, *b*, in the figure,

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shows that it was made by a worm crawling in the direction from *a* to *b*. At the point *a* the worm appears to have encountered some obstructing substance, probably a coarse grain of sand. After crowding this onwards a short distance (making the bottom of the furrow gradually deeper here and more rough) it resolved to rid itself of the clog, and for this purpose *abruptly* elevated its body sufficiently to glide over the encumbrance, and then *gradually* returned to the usual depth of its furrow—the portion of matter immediately in front of the obstruction having been crowded along and pressed together too compactly to enable it at once to regain its accustomed depth in the slime. Similar evidence occurs where it crosses a furrow previously made. It readily passes into this furrow, leaving its angles on this side open and smooth, but on the opposite side where it emerges, the angles of the older track are more or less filled up and obliterated; and sometime here the matter becomes crowded into so dense a mass on one side or the other, that the worm as in the previous case abruptly elevates itself and glides over this compacted portion, as is represented (quite imperfectly, however) on the left side of the track towards *b*. Thus, wonderful as it seems, we have here conclusive evidence that a fragile little worm, that lived thousands of years before Adam was created, although so weak and powerless that to move a grain of sand was a weariness to it, in crawling over the slimy sediment at the bottom of the ocean, wrote its history so plainly and indelibly as to inform intelligent beings countless centuries afterwards, of its having been present in that place and of the direction to which it was journeying when it passed there! Of a truth, it is not always folly to write one's name in the sand!

This is a discovery scarcely less valuable to science than if the remains of the animal by which these marks were made, had been found. It is authentic evidence that some short-bodied worm, probably a mollusk, such as occur in the unaltered Hudson river slates, but every vestige of which appears to have been obliterated from these Taconic slates did actually exist here at the time when these slates were deposited. And these tracks will be recognized as constituting an important addition to the science of Ichnolithology, or the History of Fossil Footmarks, in which so many interesting discoveries have recently been made; forming a new order, in that science, which order, in correspondence with the nomenclature already proposed by the most distinguished investigator of these tracks, President Hitchcock, may be named Apodichnites, or Footless-tracks. To this order will pertain as genera the different marks formed by the stomachs and the tails of animals, some of which have been already described by observers; whilst one of its most

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important genera will be that which is here, we suppose, for the first time noticed, and which (inasmuch as the precise class of animals by which these tracks were made can probably never be positively ascertained,) may appropriately be named *Helminthoidichnites*, a word implying *tracks resembling those of worms*. Of these tracks we at present know only of the two kinds found in this county, which may be designated and characterized as follows.

Helminthoidichnites tenuis. About half a line or less in width. Found in the Taconic or altered slate at the falls of the Mettowee, Middle Granville, N. Y.

Helminthoidichnites marinus. (*Gordia marina*, Emmons.) About a line or more in width. In the Taconic slate at McArthur's quarry, Jackson, N. Y. Beautifully figured in the Natural History of New-York, Palæontology, vol. 1, plate 71.

Nearly all the fossil tracks heretofore observed, on both sides of the Atlantic, have been in the new red sandstone. But we have here adduced evidence that such tracks are also well preserved in the oldest sedimentary slate of our globe. On the surface of these same slates, a most peculiar and interesting flexuous mark was observed in Salem, by Dr. Emmons, and figured under the name of *Nemapodia tenuissima*. (Vide Natural History of New York. Agriculture, vol. 1, plate 14.) These same marks were afterwards detected upon the trunks of trees; and my acquaintance with the zoology of this district enables me to say with confidence, there is no existing animal here, inhabiting the situations where these marks occur, by which they could have been made, except our large naked snail or slug, the *Tebennophorus carolinensis*. Whoever inspects the track made by this snail, well figured as it is on the plate referred to, will perceive the striking analogy which it bears to those meandering marks which have been observed upon the Cambrian slates of Britain, and the slates at Watervillein Maine, and which have been regarded as the relics of worms belonging to the Nereite family. *Quere*. Are not at least several of those supposed Nereites merely the casts of impressed tracks that were made by gigantic marine molluscous animals, in crawling upon the soft surface of these slates at the time when they were being deposited? The fact that our naked snail makes a track precisely analogous to these supposed Nereite marks, coupled with the fact that these slates do sometimes retain such tracks in the greatest perfection, gives at least plausibility to the conjecture.

237. *Our rocks indicate what our soils are.*—It is a fundamental principle of Agricultural Geology, that if you know what the rocks of a district are, you know what its soils are. But geologists have of late

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hown that those deposits which have been called diluvial and drift, have been brought to their present situations from districts north of where they are now found. This would seem to overthrow the very foundation of the science of Agricultural Geology, so far at least as it relates to these soils, and make them often wholly unlike the rocks on which they rest. As these drifted soils form the most extensive and important part of the soils of this county, I have in this survey addressed myself especially to ascertain how far these soils are related to the rocks beneath them; and am prepared to present this subject in a more clear and satisfactory manner than has hitherto been done, and show that after all the chief part of these drifted soils has been only moved a short distance, and that they are far more closely related to the rocks on which they rest, than to rocks foreign to this county.

Extended as I find this paper is becoming, I am obliged to pass over the remaining parts of it in a more cursory manner than I had designed, omitting many of the facts that have been observed, and leaving most of my remarks respecting the agricultural management of these soils and their productiveness, till we come to considering the respective crops cultivated upon them.

238. *Surface of the rocks show that soils have been moved over them.*—Among other evidences that show that stones and soil to an immense amount have been carried over our rocks, is the smoothed and polished surface which these rocks everywhere present. It is obvious that when the rock strata were first broken and thrown into the positions they now occupy, their surface would be rough and ragged in the extreme. But it is only in places that they now exhibit that appearance, whilst in other places, and these are innumerous all over the county, they are smoothed as though they had been ground, or rubbed and polished. Some have supposed this worn appearance could not have been produced by loose gravel and stones carried along by currents of water, and that these materials were more probably frozen in glaciers, and by being thus in a solid state, ground the surface to that smoothness which it presents. But this particular argument is scarcely a valid one. The sides of the "giants' pots" about our waterfalls, are always smoothed similarly to the polished surface of the rocks; an evidence that the mere attrition of loose sand and boulders, carried along by a gentle current, is capable of producing this smoothed appearance.

And on the level surface of our rocks another curious phenomenon may be every where seen. Their polished surface almost always exhibits scratched lines, and often also shallow grooves, these lines and

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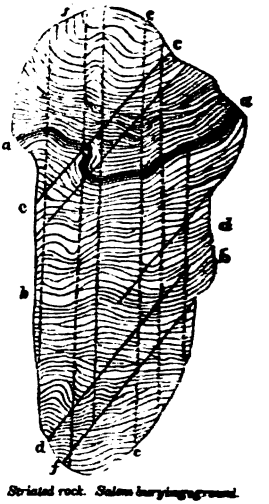
grooves running straight and in a nearly north and south direction. Thus, at the entrance of the Salem burying-ground, by removing the soil a few years ago, a portion of the rock has been laid bare, as represented in the accompanying figure. Every one on inspecting it, will be aware that this rock could never have been broken off from another mass, so as to present so smooth and worn a surface as it exhibits. And whilst the natural laminæ, which are much undulated, run in the direction from *a a* to *b b*, and the seams and joints in the direction from *c c* to *d d*, another series of lines may be seen upon it, looking as though a carpenter had laid a straight edge and drawn his scratch over the surface in a number of places in a direction from *e e* to *f f*, or from north to south. Though these marks are more distinct at several other places than they are here, this is a locality where thousands of our citizens can most readily inspect them. They are here at the bottom of a valley, but occur also on the hill-tops around, and may be seen at the summit of the hill a mile south of here, on the road-side to Shushan. Even the hardest of our rocks, the Potsdam sandstone, shows the same scratches and furrows at Flat rock, in Fort Ann; and in Argyle, on the west side of Cossa-yuna lake, the smoothed surface of a rock may be seen grooved almost like a Corinthian column. These marks are regarded as having been formed by the sharp angles of rocky fragments that have been frozen in the under surface of glaciers, and they furnish one of the several arguments that show that it is from a situation to the north of us that our soils have been brought.



Striated rock. Salem burying-ground.

239. *Different kinds of soil.*—The soils of this county, agriculturally as well as geologically divide themselves into four general and extensive formations, and a primary division of these may be made into two classes, namely, the moved, or most ancient, and the unmoved. The first of these classes will include

1st. Clay soils.

2d. Sandy soils.

[illegible]ravelly soils, in which the pebbles are rounded and worn.

[illegible]aterials composing each of these have been brought from other [illegible] and are deposited in beds of considerable thickness or depth, [illegible] rocks beneath them. But it is very evident that these soils

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were not so spread out as to cover the whole surface of the rocks. They were deposited in banks or beds only, and the rock between these beds was at first left entirely bare in numerous places, and sometimes for miles in extent. But in process of time, by the action of the elements, what was thus left a naked rock has now become disintegrated to a slight depth, and formed into soil. Hence we have as constituting an important part of the surface in this county, soils which do not belong to either of the preceding divisions, soils that have been formed directly from the underlying rock, and that have never been transported from the spot of their nativity. They form only a slight covering to the rock sufficiently deep commonly for tillage, but with the rock everywhere protruding through them, constituting what our farmers designate "ledgy fields." The science of the present day has no term, that I am aware, by which definitely to distinguish this kind of soil. I am therefore under the necessity of reviving a term that was current thirty years ago, and may be found everywhere in the Memoirs of the Board of Agriculture of this state, having been employed by Jamieson, De Luc, and others, and introduced upon this side of the Atlantic by the late Professor Eaton. I therefore name these soils

4th. "Geest" or unmoved soil. They are commonly gravel in which the pebbles are angular and rough.

In addition to these general formations, superficial tracts occur in each of them where swamps are or have been present, and where muck and peaty matter has been extensively formed. These tracts may be designated.

5th. Peaty soils.

Finally, along the margins of our streams and of our lakes soils have been and are now being deposited. These constitute

6th. Alluvial soils.

These two last are of but limited extent, and in this county are seldom cultivated, being devoted to grass where they have been reclaimed from a state of nature. A consideration of them is therefore deferred until we come to speak of our meadows and grass lands.

240. *Loam.*—I regard this term as only implying a soil charged with humus and decaying vegetable and animal matter, and as expressive of nothing which pertains to the natural character of the soil. The certificates of crops presented for premiums to our Agricultural Society almost invariably specify the crop as having been raised on a loamy soil of some kind—a loamy gravel, a loamy clay, a slaty loam or a sandy loam; and these terms are all sufficiently definite. But when the statement is simply "a loamy soil," I can form no definite idea of it

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except that it is a fertile soil in which vegetation will have a thrifty growth. Crop any of these loamy soils constantly, and without manuring them, and they lose their loamy character and become meager gravel, clay or sand. On the other hand take the most barren sand or gravel bed and by manuring and judiciously tilling it, it can soon be changed into a loamy soil. The term expresses the condition only and not the nature of the soil, and hence for the purpose before us its use is superfluous.

240. CLAY SOIL. (*Albany clay formation.*)—This is the gray and blue clay of the Quarternary Division of Prof. Mather, the Tertiary clay, or Albany and Champlain clay of Dr. Emmons, in the volumes of the State Natural History. As neither its geological age or name is well settled, I prefer designating it the Albany clay, a name by which more readers will obtain a definite idea respecting it than by any other. It is well developed at the capital of our state, where in levelling and grading the streets, &c., it has been extensively exposed, and has been observed there by far greater numbers of our citizens than at any other locality. From thence it reaches north, forming the bluffs or river *hills* upon both sides of the Hudson, and without stepping off from this clay the traveller may pass to Fort Ann, in this county, if not to Whitehall, from whence it may be traced onwards through the whole length of the Champlain valley, particularly upon its Vermont side.

241. *Details of its extent in this county.*—Through most of its extent in this county this clay lies directly upon the Hudson river *slate*, though in places extensive beds of gravel, to be considered in another place (§ 260,) intervene between it and the slate. It thus occurs all through the west side of the town of Easton, extending to a distance of two miles or more from the river. The Batten-kill (as does the Hoosic, also,) appears to have cut through this formation, for along its course on each side a belt of sand and gravel, two or three miles in width, reaches out to the Hudson, and it is only on the narrow river flats that the clay here extends nearly or quite up to this stream at its mouth.

To the north of the Batten-kill this formation again spreads out to a considerable width in the west part of Greenwich, and through Fort Edward and the west part of Argyle it is the prevailing soil, except as it is replaced by some gravel ridges and extensive tracts of *geest*. It forms the so called "Lowlands" of these towns, and extends up along the Moses kill to the village of Argyle, around which it is the surface soil over tracts of considerable extent.

In Kingsbury this comes out from under the sand and becomes the surface soil of all that part of the town north and east of Fort Edward

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creek, this stream here occupying the dividing line between these two formations.

West Hartford, like West Argyle, is mostly geest, or a slaty gravel derived directly from the underlying rock, yet as upon Moses kill, so here, this clay runs up along East creek and Mud creek, (to which it gives name,) forming a strip along this last stream scarcely a mile in breadth. This fact is the more notable, as being the reverse of what occurs along Batten-kill.

It is the prevailing soil in the south and east part of Fort Ann, here resting in places directly upon gneiss and Potsdam sandstone. It predominates in Whitehall also, both along South bay, Wood creek and through all the eastern half of this town, where it directly overlies the Taconic slate. In Dresden it only occurs in a few limited tracts along the lake shore, the most extensive of which is at South bay; whilst through the east part of the town of Putnam it constitutes the prevailing soil.

It is impossible for me to state the extent of any of our soils with accuracy, so irregular are their boundaries and every where varied as they are by tracts of a different kind. On looking over all the data which I possess, I should estimate this Albany clay formation as here forming the surface soil of about 75,000 acres, or one-seventh part of the county. It occupies the lowest and most level part of the county, and forms the river flats, bluffs and plains, which reach east in some places to the base of the Bald mountain range of hills.

242. *Its depth and structure.*—East of Comstock's Landing, the thickness or depth of this clay in places is 20 feet or more. From Fort Edward towards Argyle, and from the Black House through Dirkeetown, it covers the slate rock to a depth of 15 to 20 feet. It attains a greater thickness the farther we pass down the Hudson, and in the lower part of Easton, in some of the river bluffs it occurs with a vertical height of at least 100 to 150 feet.

It plainly underlies the sand formation, often at a great depth beneath the surface. In the rear of the Baptist church at Sandy Hill is an interesting exposure, showing this clay with a thickness of six feet resting directly upon the Hudson river slate and overlaid by the sand. The sand is here arranged in layers or beds of different texture, which dip gently to the east, whilst this stratified clay beneath it is in nearly horizontal layers.

But the most important and instructive exhibition of this stratum I have met with, is at the deep cut of the railroad across the river from the village of Fort Edward. On entering this cut, which is a half mile long, exceedingly tough, stratified clay occurs in even laminæ about an

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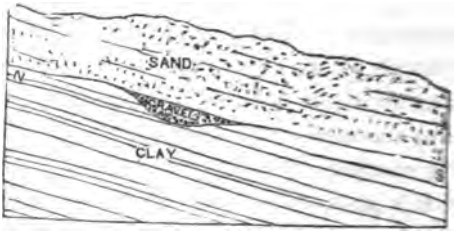
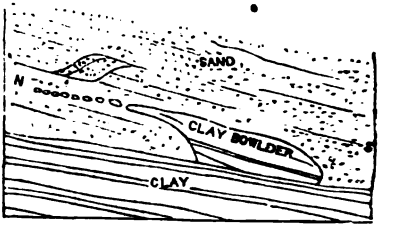
inch thick, though variable in their thickness, and separated in many places by layers of sand, sometimes as thin as paper, at other times as thick as those of the clay with which they alternate. On proceeding south, the sand formation appears in the top of the bank, and gradually increases in thickness till it supercedes the clay. The sand too is stratified, and was evidently deposited from a current of water moving towards the south. Several interesting phenomena present themselves along the line of junction between the clay and the sand. We have space to allude to but two of these, which are illustrated in the accompanying figures. At one place a sudden depression or small hollow, 10 inches in depth, occurs in the smooth upper surface of the clay, which hollow is filled not merely with sand, but with coarse gravel and pebbles, larger and more ponderous than anything we find in the sand formation here or elsewhere. At another place, a broken fragment or boulder of clay, some five feet in length, as it would seem, has been slid along on the upper surface of the clay as far as the current had strength to move it, and there it remains, with a train of gradually smaller clay pebbles deposited in a line with its upper side and at its stoss end, but which would seem more like its lee end, except for a peculiarity in the stratification of the sand above them, (where we almost seem to see the ripples of the water as it was tossed upwards to flow over the large boulder,) and marks occurring at other parts of this locality.



Section No. 1. *Railroad excavation. Ft. Edward.*



Section 2. *Railroad excavation. Ft. Edward.*

We thus have evidence that after this Albany clay stratum was deposited and had become so compacted as to enable portions of it to be broken and rolled away, currents of water passed over its surface of such violence as to carry along large heavy boulders, and that these waters actually did carry along gravel and pebbles, some of which were caught in the hollow in the first illustration, through which the current could not sweep with the strength it had elsewhere. After that,

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from a more gentle current, the sand formation was deposited. It hence follows that there must be deposits somewhere, of drifted gravel, between this clay and sand, a situation different from that to which any gravel deposits, I believe, are referred at present.

243. *Its origin, age and composition.*—This clay has been mostly derived, we suppose, from the disintegration of the slate rocks, blended probably with some matter from the other strata that had become broken and ground to a fine powder. It consists of the mud and silt that has settled from turbid and roiled water where it was in a still and quiescent state.

Though marine shells occur in some of the clay beds down Lake Champlain I have been unable to meet with any evidence of its being so ancient a formation within this county. Along the river bank below Fort Miller falls, stratified clay which I deem can be no other than this formation abounds in well preserved specimens of Planorbis trivolvis and other species such as now occur in the still waters of our streams and lakes. In a clay bed at Port Henry in Essex county the remains of shells were observed, which were too far decayed to enable me to identify them, but which appeared to be a species of Lymnœa. This is the only evidence I have met with bearing upon this subject.

This soil differs considerably at different localities. In some places, I have been told that mere exposure to the air and moisture renders it friable and pulverulent. But generally the frosts of winter are necessary to reduce it to this state and adapt it for a crop. Our farmers judge of it more by its color than any thing else. It passes through different shades of blue, brown, gray and white; and it is said the lighter the color is, the poorer is the soil, what is called "white-faced clay" in Fort Ann and Hartford being the least esteemed. The more Horizontal the surface lies, also, the less productive it is said to be, but this is probably owing to the moisture not draining so rapidly from such places, rather than to the quality of the soil there. Four specimens from this formation have been analysed by Mr. Salisbury, and two of the yellow clay to be noticed hereafter as a subordinate of the drift formation. These specimens of soils for analysis, it should be here observed, were mostly selected with the view of showing the natural inorganic constituents of our soils; hence situations that had been enriched by artificial manuring were avoided, or the subsoil (12 to 16 inches beneath the surface) taken rather than the surface soil. The results of the analyses of the clays are as follows.

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Composition of the clay soils of Washington county.

	Albany Clay Formation.				Drift formation.	
	Blue clay, Whiteball. Subsoil.	Gray clay, Argyle. Subsoil.	"White faced clay," Hartford. Subsoil.	Surface	Yellow clay, Salem. Surface.	Subsoil.
Organic matter,.....	9.50	11.74	9.98	6.88	9.54	4.50
Carbonic Acid,.....	0.23	3.11	trace.	trace.	0.28	trace.
Silica,.....	57.16	60.76	55.50	79.14	76.40	78.74
Alumina,..... Per-oxide of Iron, ...	22.70	14.48	23.50	9.50	10.99	12.54
Phosphate of Alumina,..... Phosphate of Iron,.....	0.86	0.46	0.76	0.98	0.84	0.96
Lime,.....	4.94	4.92	1.78	0.34	0.10	0.24
Magnesia,.....	0.72	1·22	0.36	0.96	0.23	0.22
Potash,.....	1.64	0.88	1.06	0.16	0.38	0.46
Soda,.....	1.56	1.96	6.60	0.28	0.55	1.42
Chlorine,.....	0.16	0.25	0.16	0.32	0.18	0.36
Sulphuric Acid,.....	0.08	trace.	0.04	trace.	0.12	0.08
Total, ...		99.80	99.14	98 56	99.64	99.57

A most singular fact shown in this analysis is the discrepancy between the surface and subsoil in the Hartford specimens, and I am not without suspicions that some of these sandy layers that are frequently interstratified with the clay had here occurred and had been so broken up and incorporated with the soil by cultivation that nothing of this kind was suspected. The similarity in composition of the surface clay here to that of the yellow clay subordinate of the drift is an unexpected result. But these clays are all much more closely allied in their chemical composition to the gravel or drift soils and are more deficient in lime than our inhabitants have supposed. They have been heretofore called "marly clay" by scientific authority, and the mode in which they slake and crumble to powder has led many to suppose they were highly charged with lime. Indeed they appear to be little else than the fine materials of our gravel soils sifted or washed out and deposited apart. This clay at Albany, according to Dr. Emmons's analysis, contains organic matter 1.17, sulphate of lime 1.00, silicates 69.02, per-oxide of iron and alumina 17.24, potash 0.14, carbonate of lime 4.00, magnesia 3.00.

244. *Timber growing upon this clay.*—On the summit of the bluffs near the middle of the town of Easton, an enumeration of some hundreds of trees (of the second growth) gave as follows: Chestnut 27 per cent, maple 22, white oak 16, white pine 16, poplar 8, chestnut-oak 4, beech 2, black birch 2, ash, black oak and hemlock 1 each.

This clay is so retentive of moisture that swamps sometimes extend nearly or quite out to the summits of the river bluffs. Considerable tracts of this kind occur between Fort Miller and Bald mountain, that

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can readily be drained and converted into lands of fair quality. These swampy tracts now bear a stinted and moss-covered growth of white pine and white oak, interspersed with maple and chestnut and a few elm and hickories, and in lower and colder situations hemlock is the prevailing timber.

Along the lowlands of Winchell's creek, Fort Ann, the swamp white oak (*Quercus bicolor*) was noted as abundant. This is esteemed by the mechanics in the vicinity as equally or even more valuable than the common white oak. Black ash is also abundant here; and elm, soft maple and poplar are common.

245. *These lands are best adapted for grass and grazing.*—It is for the growing of grass rather than grain, that these lands are naturally adapted; not but that they are susceptible of yielding as large crops of grain in favorable seasons as any other soils; but it is at a disadvantage which does not attend the cultivation of our other soils. Plowing cannot be performed except at particular times, causing the farmer to be excessively hurried when the period for it arrives; and then if the season is unduly wet or dry he gathers but a stinted crop.

Impressed with the fact that their lands were better adapted for grass than for tillage, several of our farmers upon the west side of the county, particularly in Easton, have made a trial of the growing of hay; pressing it and sending it upon the canal to market. How superior these lands are for the growing of hay, and with what ease they may be kept constantly in this crop, is shown by several examples. One only of these I have here space for adducing, which I received from Henry Holmes, Esq., of Union village. Mr. Whipple went on to a farm two miles northeast of Fort Edward, 15 years ago. The farm (clay, with a gently undulating surface) then yielded only from ½ to ⅓ths of a ton per acre. He has occupied it solely as a grass farm, only plowing a few acres yearly for potatoes, corn, &c. for his family use. He keeps no stock and needs no hired help. He uses no manure except on the few acres he plows. From the rest of the farm a crop of hay, and nothing more, is taken annually. The after-math grows tall and rank, and is never mowed or pastured, but allowed to decay upon the ground. With this management, without manuring, seeding or labor, the farm has been brought up in productiveness to such a degree that it has now for years averaged two tons of hay to the acre. This, pressed and sent to market, yields a neat profit of ten dollars per acre. The only help hired is during the haying season.

But the market price of hay in our cities has been found to be so extremely fluctuating that most of those who were here engaged in this

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business a few years ago, have now abandoned it, and at the present date there is scarcely a hay-press in use or repair in the county.

Grazing has recently been the business to which the proprietors of these lands have resorted with the greatest profit, and for which their farms are eminently adapted. But it is not all kinds of stock that can be kept upon them with equal advantage. Sheep are here so subject to the foot-rot, as we have otherwheres stated, that the owners of flocks have been constrained to sell out their stock as the only mode of ridding their premises of this disease. Cattle, however, for dairying purposes and for beef, and horses for market, are the kinds of stock that are here kept with the greatest facilities and the fewest drawbacks.

246. SANDY SOILS. *Saratoga sand formation.*—The sandy soils have such a limited extent in this county, occupying less than one-twelfth of its surface, in tracts commonly of quite small extent, that we allude to them only briefly, to indicate the situations in which they occur.

The Saratoga sand formation for which no name more definite and appropriate than that which I use can probably be given, and which will be readily understood without explanation, reaches into this county in the southwest part of Kingsbury, and occupies all that part of this town and of Fort Edward which is south and west of Fort Edward creek, being a tract of nearly 5000 acres. It also extends a half mile south of the mouth of Fort Edward creek; forming the Flats along the river here. This is the most extensive deposit of this kind within the county; though another branch of the same stratum runs into the southwest corner of the town of Fort Ann. This sand is made up chiefly of grains of white and of hyaline quartz which are more or less rounded and worn. But among these are scattered minute fragments of hornblende and several other minerals which appear to have come from the primitive rocks of Northern New-York. Magnetic iron sand, mica, garnets, &c. may be detected among it. At the deep cut of the railroad opposite to Fort Edward, already described (§ 242), an occasional layer an inch in thickness, composed largely of magnetic iron sand, may be seen interstratified with the common sand.

It is upon this tract only, that we in this county meet with those fields and hillocks of loose, drifting sands which occur in Saratoga and the counties south of it. And where these sands have recently been drifted by the winds, the surface may often be seen, "rippled" as regularly and beautifully as though it had been done by the waters of the sea.

247. *Hygrometric Ground-star.*—Upon these drifting sands a most curious species of fungus occurs, constituting the only thing possessing vegetable life, that is able to subsist amid the arid waste around it. It is the hygrometric Ground-star (*Geastrum hygrometricum*) and a short

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popular account of it may interest the reader. It is a kind of puff-ball an inch or less in diameter, resembling in form an orange with the rind parted down to the base in about eight divisions. In wet weather, this rind is extended back so as to lie flat upon the surface of the sand, appearing like a star of a white color with a little brown ball in its center. In dry weather the rind is drawn together so that it closely grasps and envelopes the ball, containing the seeds, which thus pressed, issue from a small orifice at its summit. Thus, as though it was a sentient being, it spreads open its arms at night and in time of rain to drink in all the moisture within its reach, and closes them when the sun comes out, to shield itself against his too powerful rays: these arms are a mantle, as it were, which the puff-ball draws around it or throws off, according to circumstances. And as it has no root but lies unattached on the surface of the sand, in dry weather it is a globe, which the wind often rolls about as it sweeps away the sand from beneath it. But though thus rudely turned over and left lying upon its side, as its arms begin to open with the dews of evening, they gradually turn it back into an upright position, and in this act raise it on to the surface again when it is half buried under the sand. It is one of the most singular and interesting vegetable curiosities we meet with in this district; and it appears as though the Author of nature had designed that no part of his vast domain should be a blank and therefore created this little star-like fungus purposely to occupy these barren wastes of drifting sand where no other vegetable can exist.

248. *Tracts of sand among the clays.*—Along the Hudson and Wood creek, occur tracts of sand similar to and which seem to be cotemporary with the Saratoga sands, though some of them may be more recent deposits. Most of the islands in the Hudson are of sand. The largest of these, Taylor's island contains seventy acres. A belt of sand over two miles in length forms the east side of the Hudson from opposite the head of Galusha's island nearly to Fort Miller. In sinking wells in two places here, decayed leaves, sticks, beech-nuts, &c. were come upon about ten feet below the surface. Another tract reaches from a few rods below Stony creek to Fort Miller bridge, nearly two miles, in which lagunes and bayous occur which were probably at one time the bed of the Hudson.

In Fort Ann several tracts of land occur, plainly overlying the clay, in Welch hollow, the hollows that make off from Winchell's creek, and along Wood creek, at Comstock's landing and other places. The following information I have from Mr. Weller, an intelligent citizen, who has had charge of the construction of portions of the public works here. On excavating the Champlain canal, it was found that all along

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the valley of Wood creek, at about six feet below the surface was a layer made up of leaves, nuts, sticks and logs, from whence springs of clear water were everywhere issuing. The nuts were plainly butter-nuts and beech-nuts. Ash and other logs, quite sound, occurred, but no pine. Pine was originally abundant on the uplands each side of this stream, but none grew down in its valley. The trees, in most instances, it was plain to see, had their tops towards the south, that *is*, up-stream. Below this layer of vegetable matter was a stratum of tough blue clay; above it was sand and loam. And in excavating for the bed of the canal-lock, eleven feet beneath the surface, the trunk of a black ash tree, two feet in diameter, and somewhat decayed, was come upon.

A most important fact in this statement is, that these buried trees were mostly found with their tops towards the south, showing that when they were lodged here, the current was running in a direction the reverse of what it now does. And as further evidence in this connection, it should be remarked that on both sides of this stream pot-holes or giants pots are worn in the gneiss and sandstone, at various *heights*, one of which, opposite Mr. Weller's residence is upwards of sixty feet above the level of the canal. Indeed we have many facts which demonstrate that Lake Champlain originally discharged its waters into the Hudson river.

249. *Sands of the drift formation.*—Numerous tracts of sand present themselves as subordinates of the drift or general deposits of this county. They occur towards the mouth of the Batten-kill and of the Mettowee, and at several places along the course of these streams and their tributaries. Sometimes these tracts are of pure sand, at other places small pebbles are intermingled, forming a gravelly sand, and they have every appearance of having been deposited at the same time that the terraced flats along our streams were formed, when a hundred fold more water was running through all our vallies than at present. Thus, in going from Comstock's landing to North Granville, after passing over the Albany clay formation we come upon pure sand, beyond which, on arising a high terrace or hill, we reach gravelly sand which forms a plain two miles in width, extending to North Granville; and this sand it would apppear could only have been brought here by a portion at least of the Mettowee river flowing off in this southern direction into the Hudson valley, instead of north where the stream now runs. And when the Batten-kill was similarly swollen, it is obvious that but a part of its waters could pass through the narrow, rocky cleft in the hills between Shushan and Clapp's mills where the stream now runs; being

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thus dammed up here, a vast body of water would flow off south through the Anaquassacook and Owlkill vallies, to Hoosic river, which stream being equally flooded, would only admit of its running hither with a current too gentle to bear along gravel and cobble-stones, and yet too rapid to allow mud to settle from it to form clay, except in places. Consequently clean sand and gravelly sand was deposited from it, which we now have in a continuous tract through these vallies, forming a belt twelve miles long and from a half mile to a mile or more in width. Space will not permit me to go into a similar explanation of the origin of the various tracts of sand of greater or less extent, that have fallen under my observation. Suffice it to say that any person by looking at the form of the vallies will perceive that these deposits of sand occur where eddies and gentle currents would exist, if these vallies were filled half way to their brims with the rushing waters of a deluge.

250. *Character and composition of sandy soils.* No lands are so mellow and easy of tillage as these. In several instances where limited tracts of sand occur on clay farms, I find these sandy tracts were first cleared and have been almost incessantly under the plow; evidently because they are so much prettier to cultivate than the clays, though less productive. Their great fault as is well known, is their loose, leachy nature, whereby they fail to retain manures and other fertilizers as do other soils. Hence also, they fail to furnish a sufficiently solid foundation for buildings of heavy materials such as brick and stone. Strangers often remark a peculiarity in the village of Sandy-hill, that in so large a village the houses should all be of wood. Of 200 buildings which the village contains, six only are constructed of brick,—so liable are their walls to settle and crack. A stone edifice erected forty years ago on a sandy tract at the head of East bay, and designed for a furnace, was only completed, when, by the settling of its walls, they became so rent that it was abandoned.

Gypsum has everywhere made these sandy lands far more valuable for tillage than they were before its introduction. The sandy plains of North Easton, before this fertilizer came into use were worthless. Fifty years ago men of property disdained to purchase them or have the name of owning them. Tracts that were then dull of sale at ten dollars per acre now command thrice and four times that amount.

Upon no point has the chemical analysis that has been made of our soils, for this survey, differed so much from my preconceived opinions as to its result, as with regard to the relative amount of organic matter in specimens of pure sandy soil from Easton, and of gravelly sand from North Granville. The latter was taken from the crest of a terrace,

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where I supposed manure never had been drawed, and the local situation favored the washing of all organic matter from the soil. I had expected it would be the most deficient in this respect of any one of the soils analysed. The sand on the other hand was taken from the plains a half mile west of the hydraulic limekilns, where the land has long been cultivated and I presume more or less manured. Yet this appears more destitute of organic matter than the Granville specimen. The fact indicates that a mixture merely of gravel with this sand tends to consolidate it, and render it more retentive. The result of the analysis is as follows:

Analysis of Sandy soils of Washington county.

	Sandy soil. Easton.		*Gravelly sand.* Granville.	
	Surface.	Subsoil.	Surface.	Subsoil.
Organic matter,	3.30	1.94	4.98	3.78
Carbonic acid,	trace.	0.24	trace.	trace.
Silica,	87.30	87.80	80.50	85.72
Alumina, Per-oxide of Iron,	7.80	8.32	9.64	7.06
Phosphate of Alumina, Phosphate of Iron,	0.46	trace.	0.06	0.42
Lime,	0.14	0.12	0.14	0.08
Magnesia,	0.04	0.06	0.48	0.36
Potash,	0.22	0.21	0.28	0.28
Soda,	0.82	0.68	1.78	0.92
Chlorine,	0.12	0.19	0.30	0.44
Sulphuric acid,	trace.	trace.	0.04	0.04
	100.19	99.55	98.20	

251. GRAVELLY SOILS.—The gravel or drift soils constitute what has from the first settlement of the county to the present time been regarded as the best agricultural part of the county, and the part which is in the most improved state. The formation consists of different beds of gravel, sand and clay variously interstratified with each other, the gravel largely predominating and intermingled profusely with stones or boulders of several kinds and sizes. It occupies all that part of the county not included in the Albany clay and the Saratoga sand formation and the formation and the tracts of geest to be hereafter specified. Geologically this formation is, and agriculturally it merits to be divided into two distinct classes.

1st. *Original drift.*—Gravelly and sandy soils, the surface of which is everywhere undulated, forming irregular knolls, ridges and hills, which with the hollows between them generally run in a nearly north and south direction.

2d. *Re-arranged drift*, terraced flats, or the pleistocene formation of

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geologists, in part. Gravelly and sandy soils the surface of which is horizontally level or nearly so; occurring in lower situations than the preceding, and contiguous to streams of water, and evidently formed at some period when a hundred or a thousand times the present quantity of water was running in those streams. These flats commonly occur in terraces or successive steps one above another, so that a person leaving the bank of the present stream passes first over a level surface of greater or less extent and comes then to an abrupt rise, it may be 2, 6, or 20 feet, on ascending which he comes on to another level, and thus ascends a succession of steps until he reaches the irregular knolls and hills of original drift or the rocky hills which bound the vallies.

Our space will not permit us to state fully the observations that have been made with regard to the age or period of these formations. Suffice it to say that beds of drifted gravel occur beneath the Albany clay, and the whole of the original drift may be an older deposit than that clay, though on several accounts, to detail which might be tedious to many readers, I am inclined to regard it as more recent. The terraced flats it is evident were moulded into their present shape the last of any of these soils.

252. *Boulders, their scientific value.*—Boulders are the detached fragments of rocks, that are or more less rounded and worn, and that have been brought from their original beds. The term embraces the various loose stones found in or upon our soils, of all sizes larger than pebbles, and includes cobble-stones as well as masses of many tons in weight. A thorough acquaintance with them constitutes the first step in a study of these soils. They are here of much the same importance that a knowledge of fossils is in a study of the rock strata. They enable us to tell with a close approximation to accuracy the amount of soil in different places that has been derived from each particular rock; and one conversant with the chemical composition of the rocks from which they have been derived, will be able to form a tolerably accurate judgment of the kind and quantity of the several inorganic constituents of a soil merely from an examination of its boulders.

253. *Their economical value.*—These boulders are scarcely less important in an economical point of view. They do much towards giving character to particular soils and adapting them for certain crops. This is especially true with regard to the cobble-stones or "hard-heads" which occur in such profusion upon some of our terraced flats. They in some measure cover and shelter the surface from the direct rays of the sun, and thus diminish the evaporation of its moisture. In the hot months of the year, they remain so much more cold than the surrounding air that (like a tumbler just filled with cold water,) they condense

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its moisture, and are hereby covered with wet to such a degree that it trickles down from their surfaces into the ground; and laborers, observing this, are accustomed to speak of excessively warm days as being so hot as to start the sweat out of the very stones in the fields! In the night time, moreover, they are more warm than the atmosphere, and then radiate the heat they had acquired during the day. Thus these surface stones have a two-fold effect. They tend to prevent the ground from becoming parched with drouth, and they equalize its temperature, making it more cool in hot days and more warm in cold nights. This does much towards explaining what long experience has shown, that lands covered with these stones are among the best lands in our country for the growing of Indian corn. Many of our farmers are quite short-sighted in wishing as they do, that these stones were all removed from their fields. There is no doubt that were this thing done, those fields would be less productive than they now are. Instances have been related to me, in which these surface stones have been all picked up and drawed away from a particular spot in a field, and the effect has been that the fertility of the spots thus treated has been evidently diminished thereby, for two and three years afterwards. The difference between such spots and the remainer of the field has been so perceptible as to leave no doubt upon this subject. Some have attributed this diminished fertility to the plow striking more deep than it had previously done in these places, in consequence of the surface having been slightly lowered by the removal of the stones from it—and that a portion of the raw subsoil being thus brought up and blended with the surface soil has temporaily deteriorated its quality. This probably may in part have produced the effect observed; but the absence of stones from the surface has no doubt been the main cause.

254. *Cobble-stones are not raised to the surface by frost.*—Some entertain the opinion that these stones are gradually being thrown up to the surface every year by the frost; and when we see the numbers that are now lying upon tracts that have been picked over clean, time after time since the country has been settled, such an idea would naturally occur to any person. Still, we cannot regard it as at all probable that the frost is producing any such effect. Where these stones abound, the soil is not in the least of a heaving nature. Posts are never moved; and a trench for the foundation of a wall, either for fence or for a building is wholly unnecessary—a wall built directly upon the surface of this soil being not in the least liable to be moved or thrown out of shape by the frost. Moreover, if the frost was heaving these stones upwards in the least conceivable degree, it would long since have had the

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whole of them lying upon the surface and the soil immediately beneath would be free from them;—for upon the common supposition that the world has existed in its present state nearly six thousand years, if we suppose that a stone that was originally buried twelve inches beneath the surface to be moved upwards only the 500th part of an inch annually, it would ere now be upon the surface. This opinion therefore is plainly erroneous.

255. *Boulders are of two classes, drift and iceberg.*—There are two distinct classes of boulders occurring in this county, as elsewhere. First, the drift boulders, that are of smaller size, and that appear to have been brought by currents of water into the situations where we now find them. They are scattered over the surface, and beneath it are everywhere blended with our gravel soils. Second, the iceberg boulders, or those that are of such large dimensions that it is obvious they never could have been carried to the situations where we now find them by the mere force of running water. Almost invariably these last are upon the surface, or but slightly sunk into it; and it is supposed they have been transported by being frozen into large masses of ice, which masses appear in most cases to have been stranded along the summits and sides of our hills, and more particularly as I have sometimes thought, towards the heads of some of our valleys. And they hence appear to have been brought here when the present surface was but partially emerged from the sea, and when these valleys constituted the bays and coves of its waters.

256. *Iceberg boulders.*— These large iceberg boulders form uncouth encumbrances of the fields where they occur, and our farmers are waging such an incessant and laudable war against them that ere a half century more comes round, few of them will remain to give the geologist any correct conceptions with regard to them. Hence it is important that accurate information respecting them should be recorded before they vanish forever. A map of a town or even of a school district with the situation of each of these large boulders accurately marked upon it, with a note appended stating their kind, size, &c., may one day become of a value to science such as few at present have any conceptions of. This is an exercise in which some of the students in our academies might find pleasant and profitable employment. And the scientific and antiquarian institutions, particularly of our own state, would with pleasure receive and preserve in their archives, papers embodying facts of this kind that have been carefully observed and accurately noted.

The most abundant of these large boulders, in this county, are these

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that have been derived from the granular quartz stratum of the Green mountains, and are of a more brown color than that rock possesses at any locality directly east of here, where I have seen it in place. Large boulders of limestone, of granite, and of slate also are met with. In some districts one will be found upon every acre or two, but they are commonly solitary and sometimes miles apart. None of these occur on the terraced flats that I have been able to observe or learn, a strong evidence that these flats have been formed since these large boulders were brought here. Yet on ascending the hills bordering on the flats they are everywhere met with.

The preceding generation made these large boulders the nucleus around which all the stones they could pick up near them were piled. The present generation is unwilling to tolerate such unsightly and inconvenient waste places as were thus formed, and it has become a prime object with every farmer on whose lands these large boulders occur, to remove them. They are too hard and flinty to be readily broken, and too ponderous to be taken away entire. The common practice is to burn brush and other rubbish over them, and when thus heated dash water upon them, whereby they crack and scale off, so far at least as the heat has extended. Ahira Eldridge, who has cleared his farm from numbers of them, informs me that by making lines with vinegar over their surface, and heating them, they crack apart in the direction of these lines and may thus be broken into fair stones for the underpinning of buildings. The statement brought to my mind the resort by which history informs us Hannibal opened a passage for his army through the Alps. But where the soil beneath them is sufficiently deep to admit of it, the most economical way is to dig a hole down beside and partly beneath them, so deep that when they are tipped down into it, they will be a foot or more beneath the surface, and thus bury them. Numbers have been got rid of on the farm of the Hon. B. Blair in this way.

257. *Different species of Drift Boulders.*—To speak intelligibly of our drift soils it is first necessary that we designate what the boulders in it are. It is a prevalent idea with our inhabitants that there is no end to the different kinds of stones in our soil, yet when one collects and compares them he will find he cannot make out but about twenty-five different kinds, and several of these are obviously only varieties of each other. A primary division of them might be made into three classes, the compact, the slaty, and the conglomerate. The first of these will include the most numerous and interesting kinds, the sand stone boulders; and the whole may be referred to one or another of the following species.

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a. *Cobblestones*, or "hard-heads" as they are commonly and expressively called in this district, "paving-stones" as they would be designoted in the vicinity of our cities. These are commonly much worn and rounded, of a dull white color; and have been derived from the granular quartz stratum of Vermont; though to the west of the Bald mountain range of hills they begin to be intermingled with those that have come from the Potsdam sandstone, the fresh fractured surface of these last having an earthy instead of a vitreous lustre. Globular specimens as smooth and nearly as round as cannon balls are found, though exceedingly rare. The most perfect one I have met with is 2 inches in diameter and varies but 2.10ths of an inch from a perfect sphere. A curious variety of these cobblestones, having the surface punctured as though it had been irregularly and after profusely pricked with the point of an awl is quite common, caused by the decomposition of coarse grains of a yellow color that are diffused through such specimens, which grains appear to be a calciferous sandstone from which the lime has escaped. The occurrence of such grains in the granular quartz rock is a new and interesting fact, that could scarcely have been detected except for the boulders. This species of boulders is superabundant in the terraced flats along the Battenkill, is rare in the original drift, and is not found at all, I believe, in the Camden and some other vallies.

b. *Gray sandstones*, or boulders from the Taconic sandstone, are commonly of a dull gray color and opake. They are destitute of that crystalline appearance, and highly vitreous lustre which the preceding present, when derived from the quartz rock, and more crystalline and vitrified than cobblestones that have come from the Potsdam sandstone; yet specimens occur that it is difficult to discriminate, so nearly do they approach each other. These are the most abundant sandstone boulders in our drift soils, but wholly disappear from large tracts of our terraced flats.

c. *Ferruginous sandstones*, commonly called "rotten stones" by our inhabitants, of a snuff-yellow and sometimes a brick-red color, and more or less friable, being the partially decomposed variety of the Taconic sandstone are also common in the same situations with the preceding.

d. *Red sandstones*, very compact, rounded and much worn, varying in color from a deep brownish or blackish red to a light purplish red, are met with all over the county and their parent source must have been prolific. I have never seen the rock in place, from which they have been derived. Some of the specimens were recognized by Prof. Adams

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as identical with the red sandstone of Snake mountain, Addison county, Vermont.

e. *Milky quartz* boulders, much worn, but never with the smooth even surface of the cobblestones, in consequence of being pervaded with fissures and geodes, are everywhere associated with the cobblestones. In their fissures traces of rock crystals are common, and still more common are stains of green chloritic matter. These boulders have come from the intertruded veins of quartz in the magnesian slate rock, and are the only representatives of that rock which we have, the slate itself being generally so soft as to crumble and dissolve like clay.

f. *Limestones.* Though in the rock strata of this district limestone is most abundant, boulders of it are exceedingly rare and in vast tracts of drifts are wholly wanting. They nowhere exist except among the debris of limestone ledges or in the immediate neighborhood of their parent source; though large, iceberg boulders of this rock are sometimes met with. When our drift soils were first deposited, limestone boulders were no doubt abundant in them, being sufficiently solid to resist attrition better than many boulders which we find common at this day. But the vegetation of uncounted centuries has fed upon them and they have now not only disappeared, but even the soil, as shown by analysis is remarkably deficient in this valuable mineral.

g. *Hornstone* occurs in black, flint-like, small boulders, less rounded than the sandstones, and evidently derived from layers in the Taconic slate.

h. *Jasper*, more or less perfect, bright red and sometimes green, is found, scarcely differing from hornstone except in color and in being thinly seamed with white quartz in almost all cases.

i. *Red slate*, of the same bright red hue as the preceding, but differing from it in possessing a perfectly slaty structure, is noticed everywhere on account of its bright color. Its boulders are flat, smoothly worn, and often mere pebbles in size. Both this and the preceding are from the Taconic slate stratum.

j. *Taconic slate*, in flattish boulders and pebbles commonly of a gray or blackish color and splitting with a slaty cleavage, is abundant in all our drift soils. Its boulders are sometimes of a rhombic form, and perfect crystals occur with their angles only worn off. Greenish boulders, from the borders of the magnesian slate are also sometimes met with.

k. *Sandstone breccia*, a conglomerate of whitish quartz pebbles held together by a silicious cement, like the Oneida conglomerate, though appearing more like a subordinate of the red sandstone (d) is occasionally found. It is a compact, rounded and worn stone, of which there

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appears to be two or three varieties, one of which is perhaps a subordinate of the Taconic sandstone.

l. *Greenstone.* This is of a dull gray color speckled with white (feldspar) and sometimes with black (hornblend) spots from the size of a pins head to that of a pea. These boulders are derived from the dykes of greenstone north of us in Vermont. They are generally flattish and occur from a few inches to one or two feet in breadth. They are quite rare, but a specimen or two may be found in almost every stony field.

m. *Syenite*, both coarse and fine grained is occasionally met with.

n. *Granite.* This occurs quite sparingly and of as many varieties as there are localities from whence it has been derived. The parent source of all the specimens on the east side of the county appears to have been the Green mountains, though the exact locality of most of them I should be unable to specify, they are so different from this rock where I have seen it in place.

Though not perfect, the above descriptive catalogue will enable any one, in conjunction with the information in other parts of this paper, readily to distinguish all our boulders. Possibly one or two kinds may be found in addition to these, and some specimens will also present themselves so altered from their original character as to be anomalous.

258. *Distances the soils have been transported.*—Certain facts throw pretty clear light upon this interesting point. Boulders of greenstone, as already observed, are occasionally found. The nearest known dyke of this rock is at Hubbardton, Vt., and such dykes become more common farther north. These greenstone boulders therefore have come a distance of at least forty miles, and from the north, as no rock that could furnish them exists to the east, west or south of here, except at a great distance. The same remark may be made of the red sandstone boulders which have come to us from a distance of sixty miles or more. It is certain therefore that a small portion of the ingredients in the soils of this county have been derived from places thus remote. But the greatest part of the boulders in our drift soils are but little worn or smoothed, and are from the Taconic slate and sandstone. With regard to the rounding and polishing of boulders as indicative of the distances they have travelled, it may be observed, that the granular quartz is the hardest of any rock in this district, and its boulders brought down the Batten-kill from Sunderland, to the mouth of White creek, a distance of but 20 and 25 miles, all become as perfectly rounded and polished as any stones we meet with. Another fact is not less stricking. Cobble-stones from the same stratum occur in the original drift, where they have been brought from a north instead of a due east direction, and have consequently come from a much greater distance than those we

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find along the Batten-kill, and yet they are much more angular and rough. This is conclusive evidence that they have been brought here in a different mode, which has prevented their being rubbed and ground as they are when moved by a current of water along the bed of a stream and goes to confirm the theory that they were shielded from attrition by having been frozen in glaciers when they were moved hither. I have met with no boulders having glacial scratches upon their surface, but have not examined sufficiently to say that such do not exist here.

259. *Gravelly tracts associated with, and west of the Albany clay.*—We proceed to notice briefly a few of the local details respecting the drift or gravelly soils.

In Putnam a tract of gravel skirts the clay soils on their west side, towards the base of the range of mountains that pass through the west part of this town.

At Flat rock in Fort Ann a bed of drifted gravel and boulders of all sizes up to two and three feet in diameter, derived from the New-York rocks, may be seen resting directly upon the Potsdam sandstone, with a thickness of about twenty feet. Analogous deposites occur at numerous points in this section of the county.

"The Ridge" on the summit of which the road from Fort Miller to Argyle passes for a distance of two miles is a hillock of drift, which seems to overlay the Albany clay, though whether it does so or rises from beneath the clay, I could not learn in the vicinity. This drift is of a more loamy character than usual. Some boulders of red sandstone occur in it, but most of its boulders appeared to be of Taconic sandstone. It is much esteemed for tillage, crops upon it being more sure than on the surrounding clays.

260. *Drifted gravel beneath the Albany clay.*—The best locality within the county that has occurred to my notice, showing the drift beneath the clay is upon the west bank of Moses-kill, near Reid's mineral spring.

Here a bed of gray sand and gravel with worn pebbles and boulders is exposed 15 rods long and 30 feet thick, with the Albany clay, of a gray color, as distinctly exposed, overlying it and forming the summit of the bluff. The deposit is made up of different layers of sand and gravel which dip towards the south at an angle of about 15 deg. The stones and sand here give me no distinct indications of the particular source from whence they have been derived, seeming as they do to contain some materials from nearly all the strata from the Taconic slate downwards, including some of mica-slate, which I have not noticed elsewhere. Portions of the gravel beds here are becoming cemented together into "pudding-stone," both by the evaporation of lime-water and

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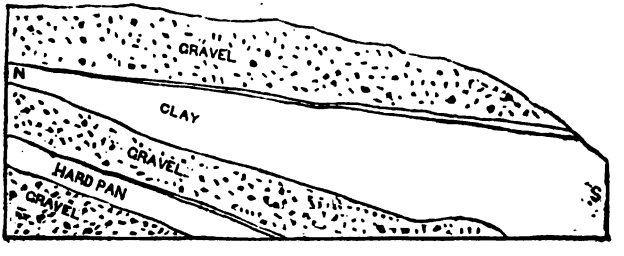
by a calcareo-argillaceous matter which oozes from the clay above and running down among the sand and pebbles cements them together, baking so hard as to be scratched only with a knife, the finger nail making no impression upon it. It is curious to observe in this and some other of our clay banks where the frost is coming out of them in the spring, how streamlets of dissolved clay from the size of a pipe stem to that of a finger, run down the face of the bank like tallow from a running candle, till they become so far evaporated as to lose their fluidity. Thus one class of clay stones as they are called, is formed, and portions of these banks become beautifully covered with these concretions, resembling the roots of trees or tangled masses of worms.

With regard to the relations of the clay to the drifted gravel I may observe further that at the locality at Fort Miller already alluded to (§ 243) as containing fresh water shells, the clay is exposed in the bank of the river for a half mile with a thickness of some fifteen feet. Some rods north of this exposure, in excavating for the foundation of the new woollen factory, stratified clay, to all appearances similar to and a prolongation of the same deposit, was come upon in the situation exhibited in the annexed section, having here a thickness of six feet on the south and one on the north.



Section of drift strata. Fort Miller.

Above the clay and also above the hard-pan is a thin layer of similar clay of a dull reddish color. I know not how to regard the clays here and elsewhere upon the river flats as a different formation from those in the river bluffs, continuous as they are from the one situation to the other.

261. *Moraines along the west base of the Bald mountain range of hills.*—A series of gravel knolls and ridges, called moraines in geological works, occurs all along the west base of the Bald mountain range of hills. Space forbids anything more than a general allusion to these. They are most perfectly exhibited along the west base of Todd's mountain in Argyle, where they rise to about a fourth the height of the mountain, in those regular ridges that are designated "hogs backs" in

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some parts of this district. In other places they are a mere swell or gentle undulation of the surface, and the same gravel beds frequently repose directly against the base of the hills. The gravel composing them is coarse, of a yellow color, intermingled with stones of all sizes and much worn, with one exception. Gray wack in angular, rough blocks, such as nowhere else has been observed in our gravel soils, is here abundant; and the same rock in place, often presents itself as a subordinate of the slate in this range. Potsdam sandstone too, here occurs about as abundantly as the granular quartz cobblestones. An enumeration of several hundred boulders, many of them two feet in diameter, in a field south-west of Barber's grove in Easton gave their percentage as follows: gray wack 36; granular quartz cobblestones 14; Potsdam cobblestones 12; Taconic gray and ferruginous sandstones 15; red sandstone 8; milky quartz 6; Taconic slate 6; hornstone, red slate, limestone breccia and granite 1 each; green stone one-fourth.

262. *Gravel deposits east of the Bald mountain range.*—To the east of the Bald mountain range of hills occur the main deposits of our gravelly soils. The whole face of the country is here diversified with tracts of drift and of geest variously intermingled. A field after a slight fall of snow that has been blown and drifted by a north wind into innumerable banks and beds with the bare ground everywhere appearing between, will give a very perfect idea of the mode in which these tracts of gravel are distributed, with tracts of geest interspersed abundantly between them. And as in the case referred to the heaps of snow will mostly be arranged in beds running north and south, so these tracts of gravel are similarly arranged. In the one case as in the other this appearance will be very obscure and confused in some places and quite distinct in others. These deposits of gravel thus sometimes form steep, high hills in which no rock occurs; as in the north-east part of Argyle and on the road leading from Argyle to West-Hebron; and the plowman often wishes that the force that threw up these hills had acted with less energy and had left them less steep. But they are commonly in ridges of more moderate elevation and more gradual ascent. The road from Middle to North Granville in running west passes over a quite regular succession of these ridges with intervening hollows, of which there are six in number in a distance of three miles. It is one of the most tantalizing roads in the county. The traveller on passing through a hollow and ascending a hill espies another hollow and hill before him, to which another succeeds in the most vexatious monotony. These ridges are here spurs as it were sent off in a southerly direction from a more considerable uplift that gradually ascends to the northward of

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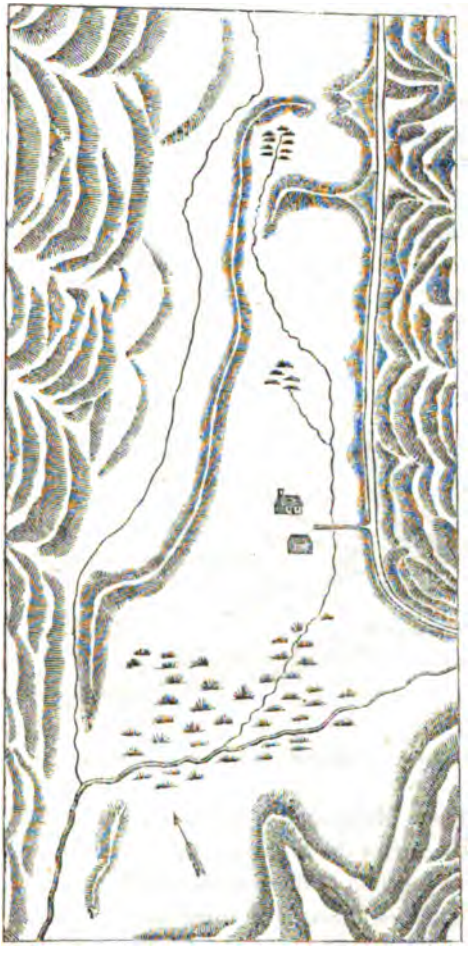
them. Quite similar to this are several ridges of gravel that appear in Argyle to the north of the road in passing from the residence of the late Esq. Hall to the county poor house; and as in the preceding case, some of the first ridges here passed are spurs given off from a high hill that rises to the north of them.

263. *Moraines.*—Moraines analogous to those already alluded to at the west base of the Bald mountain range of hills, but much smaller, oc-



Moraine on D. McFarland's Farm, Salem.

cur in several of our vallies. I am constrained to omit the notice of these that I had designed giving, and merely allude to one of them, which occurs on the farm of Daniel McFarland in the north-west part

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of Salem. A ridge of gravel from six to twenty feet in height here extends through a level interval meadow from the hill on one side of the valley to that on the other, as shown in the accompanying figure, which will make the reader acquainted with all its essential features and connections.

Moraines of another character may be seen, one near the south-west corner of the farm of Wm. McNish, Salem, and another at the outlet of Bartley's lake above West Hebron, where two straight parallel ridges of gravel, the space between looking like the excavation of a canal, end in, and are closed by a transverse and still higher ridge running from one *past the end* of the other ridge—which it strikes me ought not to be the case if this transverse ridge was the terminal moraine of a glacier.

264. *Terraced flats.*—The terraced flats form an important feature in the surface of this district. They occur along our streams of water, particularly where two streams come together. A trifling brook, even in entering a large stream, has at some time caused the land for half a mile or a mile above its junction to be levelled off into these flats. The annexed sketch of the site of East Greenwich gives a fair illustration of

Terraced flats, East Greenwich.

their form, where McDougall's brook (A) enters Batten-kill (B). A first terrace (D) carries the highway (C) above the level of the lowland meadows at the junction of these streams. To this a second terrace (E) succeeds; and above these is a third terrace, an extensive, elevated plain (F), which ends in the irregular knolls and hillocks of the original drift (G G). In almost all instances where two streams come together, the surface above their junction presents a succession of flats analogous to these, and these flats are more extensive as the streams are larger.

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Union Village, Cambridge, Salem, Granville, Middle and North Granville, are all situated upon flats of this character.

265. *Flats at the junction of White creek and Batten-kill.*—The most extensive of these flats within the county and the locality where this formation and its connections with the original drift is exhibited to the best advantage, is at the confluence of White creek and Batten-kill, called locally the Pine plains, from the astonishing growth of pine timber with which they were originally covered. The flats here arise in regular terraces one above another, like successive steps, for two miles above the confluence of these streams. On the road from Union Village to Salem, after crossing White creek at Fitch's point, six of these terraces occur within a mile, each bringing the observer to a higher level. Indeed, a nearly level tract of considerable extent here occurs amid the Taconic hills, which tract, at the period when these flats were formed, was doubtless covered with water, the narrow passage in the vicinity of Battenville not allowing it to run off freely, and thus forming a lake extending from Milliman's corners and Salem village to the Jackson ponds, and the outlet of Cossa-yuna lake, and covering an area of some twenty square miles.

266. *Parts of these terraced flats are soils that have been brought down by the streams.*—Though the name re-arranged drift, is commonly given to these terraced flats, the term is an inappropriate one, since considerable portions of them are formed wholly from materials that have been brought down by the streams from their sources. Portions of these flats, along Batten-kill, for instance, are made up entirely of quartz, derived from the granular quartz, and the magnesian slate strata, to which none of our other streams penetrate; and these soils are the most silicious in their character of any within the county off from the Saratoga sand formation. An enumeration of the boulders on the Batten-kill side of the flats above alluded to at the junction of White creek, gives cobblestones 64 per cent, milky quartz 32, hard silicious slate 2, ferruginous sandstone and red sandstone 1 each. The drift soils are never so simple as this, but contain a variety of substances from several sources. And the exact line where the silicious soil of Batten-kill terminates upon these flats, and the more argillaceous soil of White creek commences, can be distinctly perceived at many points, the soil of this last stream consisting (as upon the farms of Hon. J. Savage and D. Russell) mostly of the greenish Taconic slates from its source, mingled with a few boulders of milky quartz and red and grey sandstone, but quite destitute of cobblestones. And the relative fertility of the soils all along these two streams corresponds in a marked degree with what we

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should expect it to be when we thus come to trace these soils to their origin.

267. *Another part is drift re-arranged.*—It is only upon their margins, where they approach the original drift, that these terraced flats are properly drifts re-arranged. And that they are so here is shown by a number of instances that might be cited, corresponding with the following. In the vicinity of Jarvis Martin's quarry of Taconic sandstone, the knolls of original drift are found to contain boulders as follows, in the order of their abundance: grey sandstone, Taconic slate, ferruginous sandstone, red sandstone, milky quartz, cobblestones, red slate and jasper, hornstone and sandstone breccia. Whilst eighty rods down the course of the stream from this, and on the same level, is a terraced flat on the north side of White creek, towards the center of which flat the boulders are found to be as follows: grey sandstone 28, and ferruginous ten per cent, cobblestones 18 per cent, milky quartz 14, Taconic slate 12, red sandstone 9, red slate 5, jasper 2, sandstone breccia 1, hornstone 1, granite ½. The soil of this terrace, therefore, is identical with that of the neighboring knolls of original drift, with a slight additional infusion of cobblestone and milky quartz. Thus accurately are we able by the aid of these boulders to read out the history and character of the diverse soils intermingled upon and around these flats, and determine the proportion in each different tract that has been furnished by the rocks in its immediate vicinity, and those that are 25 and 50 miles distant.

268. *Solitary, mound-like hillocks near the junction of streams.*—Near the angle where two streams come together, there in some instances arises from near the lower end of the terraced flats a more or less rounded hillock, which is original drift apparently left unremoved in consequence of a stillness or an eddy that occurred in the overflooded streams at the point where their waters came in contact. Such a hill arises fifty feet or more above the level of the plains, at the junction of White creek and Batten-kill on the land of Sydney Martin. Its boulders, unlike those of the plains at its base (which are mostly cobblestones and milky quartz), are Taconic slate 31 per cent, Taconic sandstone thirteen, ditto ferruginous 11, cobblestones 19, milky quartz 8, red sandstone 8, red slate 5, hornstone, greenstone, sienite and granite 1 per cent each. And it merits to be further stated that nearly buried beneath the soil, mostly at the summit and down the north side of this hill appear the following iceberg boulders, from three to six feet in diameter: Taconic slate 13, Taconic sandstone 3, granular quartz 7, milky quartz, granite and gneiss 1 of each.

But, on account of its regular form the most remarkable hillocko f

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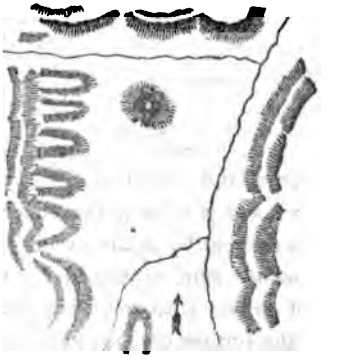
this kind that has fallen under my notice of the mound at South Granville, or "Peter Hartwell's coal-pit" as it is locally designated, in commemmoration of a waggish son of Vulcan who formerly lived in the neighborhood and who told a traveller who called at his shop door to ask what this singular looking hillock was, that it was a coal-pit he had just built, and with such an air of assurance that, Munchausen as was the statement, it was fully credited. It is almost perfectly circular, rising abruptly from a flat, like an inverted bowl, and is 43 rods in circumference at its base. Its situation with regard to the adjacent hills and brooks is shown in the accompanying figure, and I suppose it to have been rounded off into its present shape by an eddy or whirl that was caused at the point where the branch from the west met the larger one coming from the south, when both were running with the waters of a deluge. Identical with this in its situation with regard to the larger and smaller stream is the Sidney Martin hill first mentioned, which is rounded in an analogous manner, but has a slight terrace half way up its landward side, and the terraced Pine plains, already mentioned stretch off in this direction, with no hills within a mile. Analogous examples occur which I have not space to specify.



Mound at South Granville.

269. *Stratification of the drift deposits.*—These drift deposits are always stratified or consist of different layers or beds of gravel, sand, hardpan, &c. This is the case both in the terraced flats and in the ridges of original drift. In one of these ridges cut through by the highway near the outlet of the Vly a few miles south of Union village these layers were observed to be in even and rather thin beds dipping east at an angle of 45°. But generally they appear to be very irregular in their thickness and order of succession. A couple of illustrations are given, which will serve to convey an idea of this stratification. The sand-beds on J. H. Fitch's farm, from whence large quantities of the nicest of sand for mortar are at present obtained, occur in a narrow ridge or tongue of land that is sent out from a high terrace into the flat below it. And it would here seem that after the lower beds had been deposited they were partially washed and worn off; after which the carved layer of fine yellow sand, N. S. was deposited; and subsequent to this another series of beds, conformable to the first ones were formed.

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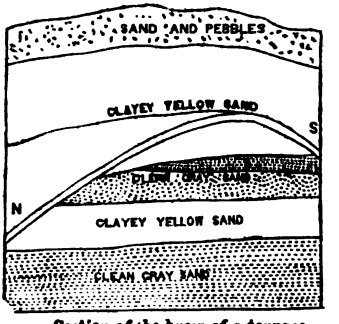
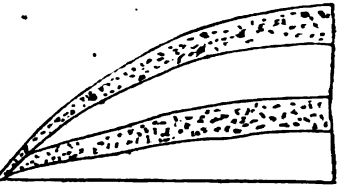


Section of the brow of a terrace, Salem.



Section of sand-beds on J. H. Fitch's farm, Salem.

The gray sand is arranged in laminæ, which are beautifully undulated in the lower portion of the upper bed. Eighty rods north of this sand-bed, a deep gully in the same terrace shows two beds of similar clay-like yellow sand separated by a bed of gravel; and overlying all is a bed of gravel with small boulders. All the beds here increase in thickness, the further they are pursued into the banks or terrace. I have had no opportunity for seeing a sufficient number of these exposures of the drift strata, to ascertain whether there is any tendency to regularity in the order of their succession; for example, whether clean gray sand (which is found in many places) is commonly overlaid by fine yellow sand as in the first of the above cases, so that having the one in the second case, we might expect to find the other beneath it.

270. *Hardpan.*—This is one of the most singular beds that we meet with in these drift soils. The term "hardpan" is in this county applied to a very tough, impervious, blue clay pervaded with pebbles, which is found interstratified with gravel and sand in our drift soils, as seen in the section at Fort Miller given on a preceding page; and the same term is also extended to a white or light yellow clay that appears to underlay all our peaty soils and swamps, forming the basin that holds their waters and prevents it from sinking down into the strata beneath. The term hardpan, therefore, is not definite, further than it implies a clay-like formation, too tough to be dug with a spade or hoe, and requiring a pick-axe or a blast of gunpowder for loosening it. In the digging of wells, cellars, &c. in the drift soils, this refractory deposit is often come upon, dipping with the same inclination and in the same direction with the strata above and beneath it. It is commonly from 3 to 8 feet in thickness, and loose gravel I am told is generally found beneath it. The most interesting instance of this deposit that has come under my observation, has been at East Greenwich. Moses Billings five years ago, here commenced digging a well, some 5 rods distant from the margin of Batten-kill, and 10 feet above its surface, not doubt-

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ing that by or before reaching the level of the kill he would obtain water. After penetrating through loam and gravel 6 or 8 feet, hardpan was come upon, having the same inclination as the surface of the hill side, dipping towards the kill and perhaps shooting under it. It appeared like a bed of pebbles cemented together by clay. A part of the pebbles were rounded, others were angular fragments of black slate often exhibiting ranges of shining cubical crystals of iron pyrites. The clay was of a blackish blue color, but changed to a light leaden blue after exposure to air a year or two, and was remarkably tenacious. On driving a drill two feet into this hardpan, with a crowbar as a lever connected to the drill by a chain, the strength of two men was insufficient to raise it except as a third man struck and loosened it with a sledge. A blast of powder then applied would loosen sometimes a cart-load of this refractory substance. Thus it was penetrated to a depth of over 30 feet and more than 25 feet below the level of the contiguous stream, the stratum here being much more dry and stiff than towards its surface. The enterprise was hereupon abandoned. A specimen of this hardpan that had laid exposed to the atmosphere a few years, was found by Mr. Salisbury to contain as follows:—Organic matter 8.20; silica 69.10; alumina, per-oxide of iron 15.32; phosphates 0.52; lime 3.06; magnesia 0.40; potash 1.40; soda 1.94; chlorine 0.16; sulphuric acid 0.02. Total 100.02. It will be seen that it approximates more closely to the Albany clay, than does any other subordinate formation which we have in the drift soils; and there is little doubt it will at some future day come into repute for top dressing the gravelly and sandy soils with which it is associated, imparting as it evidently would, some fertility to those soils, and making their texture more loamy and more retentive of manures.

The numerous localities of hardpan which I have noted in several towns, I have not room to cite. It seems to underlie both sides of an extensive gravel ridge or morain west of Milo Ingalsbe's residence in Hartford, at no great distance from the surface; and the west side of this ridge being quite steep, all the soil above the hardpan has slid down to the base of the hill in several places. On one occasion not many years ago, an acre and a half was thus left bare. But when thus exposed, the frost after a few winters loosens and crumbles its surface, so that it becomes adapted for tillage.

271. *Yellow clay.*—Tracts of clay of a yellow color, corresponding with the general color of the drift soils, are of common occurrence among these soils. These tracts occupy the hollows, the bases of terraces, and even the slightest depressions in the surface of the flats. It is common for the summits of knolls and the brows of terraces to be

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more stony than any other parts of our fields, whilst their bases are wholly destitute of stones and the gravel is here replaced by a tract of adhesive clay. All the facts show this clay to be a mere superficial deposit, formed by the fine, impalpable matter that has been washed by rains from the adjacent acclivities; and the analysis of it already given in connection with the Albany clays, show it to be more silicious and more assimilated in its compositions to the drift soils than it is to the true clays. An excavation made through the stratum at Fitch's point, Salem, from whence the specimens analysed were taken, showed its thickness here and the beds beneath it, as they are indicated in the margin.

Thickness. Inches.	*Formation.*
7	Superficial clay-loam.
24	Yellow clay.
5	Fine gray sand.
2	Stiff tenacious clay.
3	Coarse gray sand.
26	Gravel and boulders.

On these tracts of clay, grain often winter-kills when it escapes injury on the contiguous gravel soils of the same field. Nor can fruit trees be grown upon it. Several instances are within my knowledge in which apple, cherry and plum trees have been set out upon this clay, and have grown thriftily a few years, and when nearly large enough to commence bearing have invariably perished, whilst those but a few rods distant, in a gravelly situation, have experienced no such disaster. One of these instances may be briefly related. Near Rodrick Bebee's, a half mile east of the Red bridge, in Salem, an orchard was set out about the year 1810, part of the ground being this yellow clay and the remainder profusely covered with cobble-stones. The trees all grew thriftily 10 or 12 years, when every one that stood upon the clay-loam withered and died, whilst of those that stood amongst the cobble-stones, several are living, thrifty trees, to this day, yielding a fair amount of fruit as often as every alternate year.

272 *Trees buried under the gravel soils.*—The flats along White creek at a depth of 3 or 4 feet beneath the surface are everywhere pervaded with the trunks of trees, the growth of a former period of the world. These are yearly washing out at all points where the creek is wearing into its banks; and the abundance of these pleistocene fossils, as they may be called, may be inferred from the fact that some families have obtained their chief supply of fuel in some years, from this source alone. L. Lakin, Esq, who is well acquainted with this subject, says, he doubts not at the time they were first discovered, there was more timber buried under the ground, on the flats around Salem village, than was growing upon it. Wm. McCollister says he never saw any pine among this buried timber, although this was so abundant on these flats when they

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were cleared by the early settlers. A log of red beech he well remembers of examining till he was satisfied of its identity.

273. *Trees growing upon the gravel soils.*—I have space to detail but one of several observations made upon this subject. An enumeration of 800 trees on the north, the summit and the south sides of a terraced, gravel hill near the junction of Black and White creek, which hill runs east and west, has a flat summit, and is about 25 feet high, gave a per centage in each situation as follows:

	N. Side.	Summit.	S. Side.		N. Side.	Summit.	S. Side.
Beech,	28	46	5	Butternut,	2	1	4
Maple,	19	13	33	Walnut (bitter),		1	1
White oak,		12	25	Elm,	3		
Black and Chestnut oaks,		3	19	Basswood,	3		
Black birch,	4	16	2	Hornbeam,	4	3	
White birch,	15	3		Ironwood,	1		2
Canoe birch,			1	Pine,	2	1	2
Poplar,		1	18	Hemlock,	19		
Shad-bush,		1	1				

274. *Composition of these soils.*—As previous analyses had been made of the soils of the terraced flats of this county, three specimens only, and these from the original drift, were selected for analysis on this occasion. The first is from the farm of T. C. Whiteside, the others from that of Wm. McNeil. The two first columns are examples of these soils where they have been long cultivated and under good common management, whilst the third column indicates the natural soil.

Analysis of gravelly (drift) soils of Washington county.

	Cambridge. Surface soil.	Greenwich. Surface soil.	Subsoil.
Organic matter,	8.20	6.90	3.50
Carbonic acid,	0.05	0.09	trace
Silica,	86.50	77.54	81.50
Alumina, Per oxide of iron,	2.74	11.94	11.06
Phosphate of Alumina, Phosphate of iron,	0.36	0.66	0.65
Lime,	0.09	0.12	0.14
Magnesia,	0.20	0.32	1.04
Potash,	0.20	0.86	0.46
Soda,	0.88	1.30	0.82
Chlorine,	0.22	0.10	0.34
Sulphuric acid,	0.02	0.06	0.06
	99.46	99.83	99.56

A specimen of original drift from the Camden neighbourhood, in the southeast part of Salem, yielded according to Dr. Emmons's analysis, organic matter 5.80, silica and silicates 82.10, per-oxide of iron and alumina 9.21, carbonate of lime 1.06, carbonate of magnesia 0.81; total 99.58.

The soil of the terraced flats between White creek and Batten-kill, in the neighborhood of Fitch's point, a situation where the soil derived

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from both these streams appears to be blended together, was found by Dr. Emmons to contain, water of absorption 7.18, organic matter 6.12, silex 79.72, per-oxide of iron and alumina 6.12, carbonate of lime 0.12, phosphate of lime 0.06, magnesia 0.50; total 99.80. And a lower terrace, adjacent to the preceding and bordering upon White creek, but above high water mark, yielded water 3.50, organic matter 9.25, silex 77.50, per-oxide of iron and alumina 7.12, carbonate and phospate of lime, and magnesia, the same as the preceding. Both of these are instances of land under cultivation over sixty years and manured only in the ordinary stinted manner.

A specimen from the farm of E. Long (Checkered house), Cambridge, a terraced flat under cultivation since the first settlement of that town, yielded on Dr. Emmons's analysis, water 9.25, organic matter 8.25, silicates and silica 67.88, per-oxide of iron and alumina 10.31, lime 3.56, magnesia 0.75, total 100.00.

The soil and subsoil of A. Chase's farm, in the same neighborhood, also a terraced flat, as analyzed by Hon. L. C. Ball of Hoosic, yielded as follows: Surface soil, water 1.50, vegetable matter 8.50, silex 79.75, alumina and oxide of iron 9.00, carbonate of lime 0.48, magnesia a trace; total 99.23. Subsoil, water 2.76, vegetable matter 4.62, silex 83.94, alumina and oxide of iron 7.63, carbonate of lime 0.20, magnesia a trace; total 99.15.

Potash, soda and chlorine, now regarded as important elements in a soil, I suppose were not so closely searched for in these cases, as has been done in Mr. Salisbury's analyses. But they all concur in showing that these drift or gravelly soils have those constituents that adapt them well for the growth of grain and grass. The most important fact which is brought to our knowledge by these analyses is, that these soils do not contain that percentage of lime which chemists have been accustomed to regard as essential for forming a good soil. This same deficiency is ascertained to occur in other districts as here; and from the known productions of these soils in their present state, we are impressed with a belief that so great a proportion of lime as 5 or 6 per cent, cannot be so indispensible as some have regarded it. But that lime and ashes (as well as plaister which is already in general use) are fertilizers which are much needed upon these lands, there can scarcely be a doubt. Several facts collected upon these topics we hope to give in a subsequent part of this work.

275. *Their agricultural character.*—These gravelly soils are by no means of that loose texture and leachy nature that many suppose. A considerable part of the matter which they contain is ground to the state

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of an impalpable powder, which, as we have just seen, when washed out and separated forms an adhesive clay. This being blended as it is with the coarser materials renders the soil compact, to such a degree, that a bar or pick-axe is always required to loosen the subsoil whenever it is excavated.

Hence these soils are intermediate in their compactness between the stiff, tenacious clays on the one hand, and the loose, porous sands upon the other. Their materials, as we have shown, are derived from a number of rocks of diversified characters; and we suspect few soils can be found that are mixed and compounded by the hand of nature to such an extent as these are, and so well adapted hereby for easy, convenient and profitable tillage.

When first cleared, sixty and eighty years ago, wheat was grown upon these drift soils with the utmost success, and it is still the first crop that is taken from newly cleared tracts. But it is subject to so many disasters from insects, winter-killing, &c., that it has long since ceased to be a staple crop of this county. And under the old system of agriculture, when a field had become too impoverished for wheat, rye was resorted to, and was repeated year after year. An instance fell under my observation many years ago, in which one of the gravel ridges that have been spoken of, was sowed to rye five years in succession, and, probably favored by the season, the fifth crop was the stoutest of any—an exemplification of the truth of the old adage:

"Sow rye after rye,
And you'll have rye till you die."

Though well adapted for all the different crops of this climate, it is conceded on all hands that Indian corn is pre-eminently the crop which succeeds the best upon these gravelly soils, and from which the greatest profit is derived. The general practice is, to follow it with oats, and then rye with grass seeds. But this rotation is much varied, according to circumstances; and potatoes, flax, barley, buckwheat, spring wheat, winter wheat, peas, beans, &c., are all more or less grown upon them.

276. Geest soils. *Geest from the sandstones and limestones.*—Geest as defined by the late Prof. Eaton, is "soil which seems to have ever remained near the place where it was first formed." Extensive tracts in this county are purely soils of this kind; whilst in other places this is the predominating soil, intermingled very slightly with drifted gravel. These soils of course, vary greatly, according to the character of the rocks from which they are in each instance derived. The meager soil among the mountains in the north part of the county, is chiefly geest that has been formed by the disintegration of the granitic rocks of those mountains, and is yet mostly in a state of nature.

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Geest formed by the disintegration of the limestones, occurs only in very limited tracts, always in direct connection with, and resting upon those rocks, and with no boulders except limestone. A tract of this kind, some acres in extent, occurs along the road past the south end of Bald mountain: and other tracts may be seen in East Fort Ann. Probably no situations are so good as these for fruit trees. A very old yet very prolific orchard was observed in this soil on the farm of Dr. Rice in Fort Ann.

Geest from the Taconic sandstone forms more extensive yet still quite local and limited tracts, in immediate connection with the parent rock. Considerable portions of Louse hill, below Union Village, are covered with this soil, which is in places of a more red color than any soils we have elsewhere seen within the county. Another extensive tract we passed over, east of the summit of Bowen's mountain in Hartford, here forming the chief part of the farm of Wm. Gilchrist. It is an elevated, rough looking tract, out of sight of all the rest of the world, and few farms in the county have a more uninviting appearance; and yet it is the concurrent testimony of the neighborhood that more money is made upon this farm than upon any other one in the town. This will not surprise us so much, when we come to see what is the origin and composition of its soil. Perhaps there is no other rock possessing more elements of fertility within itself than does the Taconic sandstone, silex, lime, iron and alumina being its predominating constituents, four ingredients as important for forming a good soil as any that can be named; and its lime is yielded so readily to vegetation that it rapidly disappears. Of 13 per cent of this substance commonly contained in the rock, after it has been exposed to the roots of growing vegetables scarcely a trace remains. The full analysis of this rock in its solid and also its partially decomposed state has already been given. A portion of the soil derived from it, on the farm of Jarvis Martin, Salem, where it has never been manured, yielded in Mr. Salisbury's analysis, organic matter 3.80, carbonic acid a trace, silica 37.24, per-oxide of iron and alumina 6.50, phosphate of iron and alumina 0.80, lime 0.07, magnesia 0.36, potash 0.12, soda 0.72, chlorine 0.30, sulphuric acid a trace; total 99.95. I perceive Dr. Emmons had analyzed a specimen from the same locality, from which the lime had not so entirely disappeared. His analysis gives, water 1.00, vegetable matter 2.50, silex 87.00, per-oxide of iron 5.20, alumina 3.05, magnesia 0.25, carbonate of lime 1.00; total 100.00.

277. *Geest from the slate rocks.*—By far the largest and most important tracts of geest within this county, are those that have been formed from our slate rocks, of both the Taconic and Hudson river strata. In Granville it is the prevailing soil from Roger's hill west through Sly-

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borough and extending south to the neighborhood of Munro's meadows. Indeed the chief part of the upland, broken tract east of the Bald mountain range of hills, from the Mettowee river to Batten-kill is of this kind of soil, though much interspersed in some places with ridges and hills of drifted gravel. All of Argyle from west of the village to the clay flats of Fort Edward is of this soil, and this range appears to extend south to Moses-kill and north to East creek in Hartford. The chief part of Hebron and also of Jackson is this soil; and limited tracts of it occur at numerous other points. Its superficial extent is probably equal to that of the drift soils. The geest derived from the slate rocks, consists of a fine loamy substance intermingled largely with angular fragments of slate, of all sizes, forming what our farmers designate a "slaty gravel." It is thus distinguished from the common gravel, or drift soils, the pebbles in which are always rounded, or worn so as to present a surface more or less smooth. Sometimes fractures and uplifts of the slate rock, which are common and run in a north and south direction, are met with, covered merely with geest, yet bearing a close resemblance to the drift ridges which have already been noticed as running in this same direction. A most perfect similitude of this kind may be seen in the hillocks and hollows on the east part of the farm of Samuel Dobbin jr., Greenwich. But such ridges are readily distinguished from those of drifted gravel, by the rough, angular stones and pebbles in the soil, and the nearness of the rock to the surface through their whole extent.

278. *Its composition and character.*—A specimen of this soil taken from the farm of George Ferguson in Jackson, where it was in direct connection wtth the specimen of Taconic slate, the analysis of which has already been given, yielded organic matter 7.26, carbonic acid a trace, silica 75.74, alumina and per-oxide of iron 11.70, phosphates of alumina and iron 0.96, lime 0.28, magnesia 0.48, potash 1.04, soda 1.07, chlorine 0.20, sulphuric acid 0.08; total 98.81.

A specimen of this same soil, from the farm of the Hon. B. Blair, Salem, analyzed by Dr. Emmons, yielded organic matter 10.60, silica and silicates 67.24, per-oxide of iron and alumina 20.00, carbonate of lime 1.06, magnesia 0.63; total 99.53.

This slaty ground is one of the best soils in our county and for some crops it appears to excel all other soils. A few years ago the opinion became current among us that potatoes grown upon this soil were exempt from the prevailing disease. And though this was soon ascertained not to be the fact, it seems to be a well founded opinion that this important crop is generally more sound and also more productive, when grown up-

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on this than upon any other soil. Of several interesting examples bearing upon this point, I cite only one, as showing that the slates possess within themselves all the elements essential to the growth of this vegetable. When the Champlain canal was excavated, a large quantity of the Hudson river slate was thrown out on to the surface, on the lands of Dennison Andrews, Esq., south of Stillwater village; and it was at first supposed that the tract thus covered, must remain a waste forever afterwards. But after six years the surface of these stone heaps had become so broken down and disintegrated, that Mr. A. undertook to cultivate the tract. It was accordingly planted with potatoes, and without any admixture of manure or other matter, it was found that for several years this crop grew better here, than elsewhere upon his farm. But in general no distinction is made between our slaty gravel and our drifted gravel soils, and the same rotation of crops and mode of tillage is pursued on each.

279. *Concluding remarks.*—I have thus endeavored to answer that portion of the subject assigned me, in which I was required to give "The geological features, minerals and fossils of the county, the nature of the soil, distinguishing that composed of the 'northern drift' or of transported materials, from that produced from the immediate neighborhood." I have gone over this ground more in detail, perhaps, than some may deem to have been called for. But when I reflected that I was preparing a paper which all our reading farmers would peruse with the deepest interest, and which a hundred of our young men who are looking forward to the tillage of these hills and plains as the business of their future lives, will have by heart ere five years come round, I knew not how to be more brief. Man is "a thinking animal" and everything he sees around him is observed and reflected upon. Our farmers especially are not dunces but men of observation and shrewdness. And in the stones of their fields and the rocks of their hills they are ever and anon seeing things the cause of which is wholly incomprehensible to them, and which often lead them to conjectures wide of the truth. I have hence deemed I could not render them a better service than to present to them in as plain and clear a manner as the subject permits, the mode in which science teaches us these rocks and stones have come to receive the various marks which they wear. And independent of the practical benefit, which in a hundred ways results from this knowledge, the mere satisfaction of having definite and clear ideas upon such points is no small gratification. And few things can tend more to lighten the burthen of the farmer's toils than to have the book of nature so opened to him that he can read its various pages, and have the very pebbles among

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which he delves continually exciting such trains of interesting thought as to cause him for the time to forget that corporeal fatigue which his vocation entails upon him.

[A full suit of specimens to illustrate the contents of this paper will be found in the Agricultural Rooms of the State Agricultural Society, and in the adjoining Rooms of the State Cabinet of Natural History.]

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SYNOPTICAL VIEW

Of the constituents of the Rocks and Soils of Washington county, N. Y., analyzed by J. H. Salisbury.

	1	2	3	4	5	6	7	8	9	10	11
	Bald Mountain Limestone.	Hydraulic Limestone, Galesville.	Taconic Limestone.	White faced clay surface soil, Hartford.	White faced clay, subsoil.	Gray clay subsoil, Argyle.	Blue clay. Subsoil, Whitehall.	Yellow clay, surface soil, Salem.	Yellow clay, subsoil, Salem.	Sand surface soil, Easton.	Sand subsoil, Easton.
Organic matter,	0.22	0.28	4.05	6.86	9.98	11.74	9.50	9.54	4.50	3.30	1.94
Carbonic acid,	42.32	33.00	36.96	trace.	trace.	3.11	0.23	0.28	trace.	trace.	0.24
Silica,	0.44	20.04	3.16	79.14	55.50	60.76	57.16	76.40	78.74	87.30	87.80
Alumina, } Per oxide of iron,	0.36	0.88	1.96	9.50	23.50	14.48	22.70	10.99	12.54	7.80	8.32
Phosphate of alumina, } Phosphate of iron,	trace.	trace.	0.04	0.98	0.76	0.46	0.86	0.84	0.96	0.46	trace.
Lime,	51.48	42.28	47.64	0.34	1.78	4.92	4.94	0.10	0.34	0.14	0.12
Magnesia,	0.44	0.56	1.76	0.96	0.36	1.22	0.72	0.23	0.22	0.04	0.06
Potash,	0.36	0.39	0.36	0.16	1.06	0.88	1.64	0.38	0.46	0.21	0.22
Soda,	0.96	1.08	2.64	0.28	6.60	1.96	1.56	0.55	1.42	0.82	0.68
Chlorine,	0.32	0.44	0.36	0.32	0.16	0.25	0.16	0.18	0.36	0.12	0.19
Sulphuric acid,	trace.	trace.	0.16	trace.	0.04	trace.	0.06	0.12	0.03	trace.	trace.
	99.90	99.16	99.09	98.56	99.14	99.80	99.59	99.64	99.57	100.10	99 55

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SYNOPTICAL VIEW—(CONTINUED)

	12	13	14	15	16	17	17	18	19	20	21
	Gravelly sand surface soil, Granville.	Gravelly sand subsoil, Granville.	Drift surface soil, Cambridge.	Drift surface soil, Greenwich.	Drift subsoil, Greenwich.	Taconic sandstone, undecomposed.	Taconic sandstone, partially decomposed.	Soil from Taconic sandstone, Salem.	Taconic slate, Jackson.	Soil from Taconic slate, Jackson.	Hardpan, Jackson.
Organic matter,	4.98	3.78	8.20	6.90	3.50	5.74	1.90	3.80	3.36	7.26	8.20
Carbonic acid,	trace.	trace.	0.05	0.03	trace.	15.30	trace.	trace.	trace.	trace.	trace.
Silica,	80.50	85.72	86.50	77.54	81.50	52.72	90.74	87.24	71.17	75.74	69.10
Alumina,	9.64	7.08	2.74	11.94	11.08	6.24	5.56	6.50	20.20	11.70	15.32
Per oxide of iron,											
Phosphate of alumina,	0.06	0.42	0.36	0.66	0.66	0.56	trace.	0.80	0.04	0.96	0.52
Phosphate of iron,											
Lime,	0.14	0.08	0.09	0.12	0.14	13.30	0.16	0.07	0.44	0.28	3.06
Magnesia,	0.48	0.36	0.20	0.32	1.04	4.68	0.06	0.36	0.16	0.48	0.40
Potash,	0.28	0.28	0.20	0.86	0.46	0.70	0.18	0.12	1.54	1.04	1.40
Soda,	1.78	0.92	0.88	1.30	0.82	0.11	0.68	0.72	2.42	1.07	1.94
Chlorine,	0.30	0.44	0.22	0.10	0.34	0.22	0.12	0.30	0.24	0.20	0.16
Sulphuric acid,	0.04	0.04	0.02	0.06	0.06	trace.	trace.	trace.	trace.	0.08	0.02
	98.20	99.32	99.46	99.83	99.58	99.59	99.46	99.95	99.42	98.81	100.02

The phosphates were obtained by M. Schulze's method. The phosphoric acid in soils is generally supposed to be mostly combined with lime and magnesia; but in the course of the analysis, the phosphates of lime and magnesia are converted into chlorides and the phosphoric acid goes to the alumina and iron, and are obtained as phosphates of alumina and iron. The potash, in every instance, has been obtained in the form of the double chloride of platinum and potassium.

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PART FOURTH.

FLAX CULTURE OF WASHINGTON COUNTY.

280. *This crop not duly estimated.*—The editor of a paper in St. Louis not long since expressed his doubts whether a thousand tons of flax were produced in the whole United States. This illustrates how very liable we are to underrate the productions of our country by founding our judgment merely upon what we see in our own vicinity. We have single towns in this county that are annually rearing a greater amount of this staple, than this writer supposed to be grown within the bounds of our republic! And if our neighbors at the South can ever become so rash and unwise as to dissolve our present national confederacy, let them not flatter themselves that the North will continue to be dependent upon them for a supply of cotton. Extensively and successfully as flax is now being cultivated among us, it is manifest that with a trifling impost upon the introduction of cotton, the manufacture of linen would speedily be entered upon, and that it would soon occupy the place in our markets which is at present held by cotton goods.

281. *Flax originally cultivated here only for family use.*—From the first settlement in this county its inhabitants were accustomed to raise what flax was needed for their own family use, and till a recent period, the foot spinning wheel was an essential part of the furniture of every dwelling. With the first warm days of early spring the flax was dressed, undergoing by hand at the barn the operations of breaking and swingling. Then brought to the house the hatcheling was performed by the female part of the family, and the hum of the little wheel commenced, yielding a supply of yarn for the loom and thread for the needle, adequate to the family wants of the year. The introduction of cotton goods has now for some time quite superseded this branch of household economy.

282. *How its cultivation has become extended.*—During the war of 1812-'15 and the high prices which that war produced, James Whiteside of Cambridge, having carefully conned over the expense of the cultivation of flax, and compared this with the price it was bringing in market, became convinced it was one of the most profitable crops he could raise.

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He accordingly, instead of the usual patches of a few rods in extent, sowed some three acres with flax. The whole country side heard of this strange innovation upon the established order of things with utter astonishment, and the prediction was in every mouth that it would be impossible for him when it was grown to pull and secure it—that the chief part of it would never be gathered was regarded as a fixed fact. But when the proper period arrived, by employing a few hands in addition to the usual help on his farm, the entire crop was safely secured. The surrounding community could not disbelieve the evidence of their own eyes as they saw the field cleared. But the staple was not yet dressed. That was a labor it was confidently surmised which would require three or four seasons to accomplish. But when winter came, four hands were employed, who put the whole crop in a condition for market ere the season closed. It sold at a high profit, eighteen and three-fourth cents per pound being then the current price; and when sowing time came again, a still larger piece was devoted to this crop. And having acquired experience in its culture on this large scale, when peace was restored and prices fell, he still was aware it would renumerate him as handsomely as any other product which he could grow upon his farm, and therefore continued its cultivation. One and another in his vicinity began to copy his example; and now (according to the census of 1845) there is but one town in the state of New York, producing more flax than Cambridge, and that is the adjoining town of Pittstown in Rensselaer county, a town nearly double the size of Cambridge. Rensselaer, moreover is the only county in the state that exceeds Washington in the quantity of flax raised, although quite a number of other counties have more acres devoted to this crop than we. And yet in this county the cultivation of flax is confined almost entirely to Cambridge and the four towns contiguous to it, they producing eight times the quantity that is raised in all the rest of the county.

283. *Leading counties in the growth of flax.*—In the census returns for the year 1845, the town of Champion, Jefferson county is reported as producing 102,554 pounds of flax from 87⅝ acres, which would be an average of 1174 pounds to an acre! Whilst the remainder of the county produces but 105,991 pounds from 1018 acres, an average of 104 pounds to the acre. There is, beyond all doubt an important error in the return from the town of Champion, that has inadvertently come into this valuable public document, which error can redound to the discredit of nobody, except to those superficial gatherers of statistics, who snatch up the figures first presented to them, and thereupon lavish their encomiums with as little knowledge of the truth as those who erst shouted "Great

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is Diana of the Ephesians." If we allow the land sowed to flax in the town of Champion a similar yield with the other lands of the same county, the statistics of those counties in our state which rank the highest in the amount of this staple which they produce, are as follows, omitting fractions.

County.	No. of acres of Flax.	Quantity raised. Pounds.	Yield per acre. Pounds.
Rensselaer.....	1793	282,690	157
Washington.....	858	149,550	174
Cayuga.....	3814	139,126	36
Chautauque	720	129,749	180
Jefferson.....	1105	115,039	104
Chenango	646	114,911	177
Wyoming.....	1064	108,193	101
Onondaga.....	1064	107,035	100
Cortland	676	101,344	149
Wayne.....	1403	98,498	70
State of N. Y.....46,089		2,897,062	62

It should here be observed that in some sections of the State, flax is grown solely for its seed, and as the amount of this is not returned, some counties appear at an undue disadvantage in this table.

284. *The valley of the Hoosic the great flax-growing district of the State.*—It has already been stated that in this county the rearing of flax is limited almost entirely to its five southern towns. It is also in the seven towns contiguous to these in the northern part of Rensselaer county, that most of the flax of that county is grown. The valley of the Hoosic river therefore and its immediate vicinity, is the great flax-growing district of the state, twelve contiguous towns here, with an area of 344,000 acres producing over 400,000 pounds in 1845, an amount which has been much increased since, some of these towns now growing nearly double the quantity which they then did.

285. *Cause of the extensive flax cultivation here.*—What has led to a cultivation of flax in this district so much more extensive than is usual in our country, is a question which is readily answered. It is owing directly to the oil-mills here in operation ever ready to purchase the seed of the farmer, and the manufactories, equally ready to purchase his flax and tow. There are five oil-mills in operation in this neighborhood, consuming 30 or 40,000 bushels of flax-seed annually. There are also manufactories of canvass, twine, ropes, &c. that use up all the lint brought to them. These establishments therefore, convenient of access, and ever ready to pay the current value of the material brought to their doors, have made it the interest of the farmers, to enter largely into the growth of this staple.

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286. *Reminiscences connected with this subject.*—The census returns above quoted indicate that in the cultivation of this crop a greater degree of perfection has been attained in this county, than in almost any other part of the state. This calls for a particular description of the mode in which this crop is here reared and prepared for market.

By recurring to the historical part of this work, it will be seen that the present population of Cambridge and vicinity has to a considerable extent descended from settlers who came, some directly and others indirectly from Londonderry and other counties in the north of Ireland. It is a fact therefore which merits to be noticed, that we here find the culture of flax most extensively and successfully pursued among a people measurably derived from one of the most renowned linen manufacturing districts of Europe, although they have had no direct intercourse with their fatherland for more than a century.

And little less interesting is another fact. A part of the flax-seed that is here raised and carried to market finds it way to the sea-board, and is thence exported to North Ireland, where American flax-seed is in high repute, and extensive use. Thus the Cambridge farmers, though two hundred miles in the interior are supplying a portion of the seed now sown upon the same fields that were formerly tilled by their forefathers upon the other side of the Atlantic.

287. *Flax culture and manufacture in Ireland.*—The following information respecting the flax culture in the north of Ireland, derived from one who was brought up to this business there, possesses sufficient interest to merit an insertion in this connexion.

About one half of the flax seed there sown comes from America and the remainder from Holland; the amount of seed raised by the farmers themselves and that which is received from Riga on the Baltic, is too trifling to be made any account of. The American seed has the reputation of raising heavier flax, of a stronger and more durable fiber, but not so fine, as that produced from the Holland seed.

From four to six bushels of seed is sown per acre—the thicker the seed the finer is the flax, and it is the finest flax that is there most in demand. Though it grows less rank and tall when sown so thick, its quality is so much better that it yields a greater profit. It is pulled about a fortnight after the blossoms or "blue blows" as they are called, begin to appear. It is tied up in large bundles, rushes being used for the bands, and is taken directly from the field and immersed in soft water. Almost every flax grower owns a pit, excavated by the side of a stream in his neighborhood, into which the water can readily be turn-

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ed. In this the newly pulled flax is placed, and is held under the surface of the water by stones or other weights placed upon it. It remains here till the lint or bark readily slips from the woody part of the flax-stalk, which is in two or three weeks, if the water of the stream which supplies the pit is of a suitable temperature—cold brooks coming from springs not being used for this purpose. About the last of August this water-rotting is completed. It is then taken to a meadow or other piece of smooth grass-ground, where it is unbound and spread out for about a month. It is then re-bound and taken to the flax-mill to be dressed, or it is skutched by hand, by which more of the flax is saved than when the same operation is performed by the machine. This work is generally done by the women, a number assembling together in what would be called a "bee" in this country. It is always dried, by the heat commonly of a fire, preparatory to its being dressed. The dressing is mostly done in the autumn, and the spinning in the winter.

The linen manufacture, says my informant, was a business that kept all the members of the household busily and profitably employed. Even the children, in weeding the growing flax, in winding bobbins and such light work in aid of their mothers' labors, were accustomed to aid considerably in supporting the family. But, some thirty years ago manufactories for spinning and weaving linen by machinery began to be introduced. These destroyed the business that had sustained the inhabitants there in comfort for centuries—the only business of which they knew anything. And about the same time the crops of flax began to fail as they had never been known to do before—the yield from a given amount of land being unusually light. This was attributed to the use of peat-manure, which had then become prevalent. But instead of the shortness of the crops enhancing the price, the manufacturers commenced importing flax from Holland, and the Irish growers were compelled to sell at the old prices or not to sell at all. Poverty and starvation was now brought home to every dwelling; and the distress that has prevailed in the north part of Ireland is attributable mainly to these causes.

289. *Objects for which flax is here grown.*—In this district, the object for which this crop is cultivated, is not the production of flax of the finest quality, but a coarser article and an abundance of seed. The seed and the coarse flax meet with a ready sale at remunerating prices; whilst for fine flax there is no demand in our markets, and consequently no adequate inducements to attempting its growth.

289. *Perennial flax.*—Such being the objects for which flax is reared with us, there is a strong probability that the perennial flax, which grows spontaneously over the western parts of this continent and also

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in Asia and Europe, and which appears to be cultivated to some extent in Siberia, might here be a valuable acquisition. This requires to be sowed but once in three or four years, the root living through the winter, and sending up stems to a considerable height annually. The sole reason which we find assigned, why this species is not cultivated in the flax-growing districts of Europe, is, that its fiber is not so fine as is required by the manufactories there. This, of course, would form a far less serious objection to its introduction here.

290. *Physical structure of flax.*—A flax stalk it may here be stated, consists of four distinct layers, viz. the epidermis or outer bark; the liber or inner bark; the wood; and the pith. The last of these is chiefly observable in the young plant; it diminishes in volume as the plant approaches maturity, whereby the center of the stalk becomes hollow. It is to the inner bark that the chief value of this plant is owing. This is composed of very tenacious longitudinal fibers, about half as strong as those of silk, and two thirds as strong as those of hemp. It has been a prevalent idea that each stalks contains the same number of these fibers, and that therefore the smaller the stalk is, the more slender will these fibers be, and consequently the finer the quality of the flax. This idea derives some support, from the remarkable symmetry which is observed in the reproductive organs of this plant, each flower having five pistils, five stamens, five petals, and five sepals; and the pod opening by five valves, and being divided internally into ten cells, by five true, alternating with five false partitions, and inclosing ten seeds.

291. *Its chemical composition.*—Five samples of flax stalks, obtained from different places in Belgium, Holland and Ireland were analysed by Prof. Johnston, and were found to contain a percentage of ash varying from 3.65 to 5.45. The ash was composed of the following substances—Potash 7.70 to 22.86; Soda 0,00 to 19.19; Chloride of sodium 3.99 to 8.70; Lime 12.53 to 18.37; Magnesia 3.02 to 7.79; Oxide of iron 0.00 to 4.30; Alumina 0.44 to 6 08; Sulphuric acid 2.65 to 9.68; Phosphoric acid 8,81 to 11,80; Carbonic acid 13.75 to 25.24; Silica 2.08 to 21 55.

The quantity of oil in the seeds varies according to the circumstances under which they are grown; 100 pounds of seed yielding from eleven to twenty-two pounds of oil. Under ordinary circumstances a bushel of seed is stated to yield about two gallons of oil. An imperfect analysis of the seeds made by Leo Meier, gave of oil, 11 per cent; husk &c., 44; soluble albumen, 15; sugar, 10; gum, 7; with a lesser proportion of wax and resin, insoluble albumen, starch and woody fiber.

With these preliminary remarks, which we have deemed would in

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this connection be interesting to most readers, we proceed to detail the mode of cultivation and the management of this crop pursued in this district.

292. *Best soil for flax.*—The best soil for flax is a fertile loam, made so naturally and not by artificial manures. Lands that have been brought into fertility by artificial manures, produce good crops of flax, but are thought to be *less sure* with this crop than those that have never been so exhausted and worn out as to require copious artificial manuring. Good land for corn is also good land for flax, only limited patches of clay occur in the flax-growing part of the county, and on these flax does not succeed. The flax dressers say, they year after year have a good article brought from certain neighborhoods, and an inferior article from other neighborhoods; so that when a load of flax is brought to the dressing machine, on learning where the owner resides, they often know what the quality of his flax will be, before looking at it. In the town of Jackson for instance, the range of hills on the west side of the ponds have always yielded better crops of flax on their western, than on their eastern slope; indeed as fine a range of farms for the growth of flax, as any in the county, are those upon the north part and along the western sides of these hills. Now the most obvious difference between the eastern and western sides of these hills is, that limestone is much more abundant in the former than in the latter situation. From the several neighborhoods specified to me as those which uniformly bring the poorest flax to the dressing machines; as contrasted with those which bring the best, (i. e. flax of the longest and thickest fiber, causing a given weight to yield the largest amount of dressed flax), my acquaintance with the soils and rocks of those neighborhoods, leads me to the following deductions:

1. The best flax is grown upon the drift soils, and upon Geest derived from those slates that are most argillaceous and friable.

2. The Geest from the hard silicious states, never produces good crops of this staple.

3. Neighborhoods where thick bedded Taconic sandstone and sparry limestone abound, appear to be less favorable than other situations.

4. The terraced flats along our streams, being generally less loamy, are not regarded as so good for this crop as the drift lying in its original state.

293. *Rotation.*—Most of our flax is raised upon ground that had been in corn the preceding year, but quantities are also grown, where potatoes are the antecedent crop; and it is the current opinion that potato is preferable to corn ground, for flax. An instance is told me in which it was sown upon greensward, newly broken up, and the yield was only

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23½ lbs. of dressed flax from an acre; and this so short and so poor in quality, that it was not worth within two cents per pound of the current price. The reason of the failure probably was that the ground could not be sufficiently pulverized to adapt it for this crop. It was in former years a common saying, that a good crop of flax could not be grown from the same ground oftener than once in *seven* years, it being imagined that something was extracted from the soil by this crop, that it required this length of time to restore; but this opinion it is palpable was erroneous, and of several instances that might be adduced, to show this, the following is a notable one. In the year 1835, A. C. from an acre of ground manured and in potatoes the preceding year, obtained 400 weight of dressed flax. The ground was laid down to grass the two following years. In 1838 it was broken up and again planted with potatoes, and in 1839, another fine crop of flax was grown upon it, which though not yet dressed will undoubtedly exceed 350 pounds. On any land well adapted for the growth of flax, and that has not had its original fertility exhausted by over cropping, I am assured the following rotation may be pursued, and good crops of flax obtained for any length of time that may be desired, and without any deterioration of the land.

1st year, corn or potatoes on greensward without manure.

2d year, flax with grass seeds.

3d, 4th, and 5th years, grass in *pasture.*

Repeat *ad libtum.* Were the grass mowed, this would exhaust the land, it is conceded, but not if pastured.

291. *Preparation of the ground.*—In no case should fresh manure be applied to ground where flax is to be sown. It causes so rank a growth of the flax that it is apt to lodge, and it is also quite liable to be attacked by the rust. If manure is used at all, it should be with the preceding crop, or better if its application is still more remote.

Ground for flax is rarely, if ever plowed here till in the spring.* It is carefully and finely plowed though not materially different from what it would be for any other crop, upon the same ground. The land is not laid in ridges, separated by dead furrows; no attention to this matter being needed on those soils, where with us flax is mostly grown. The plowing is done as soon as the ground is in suitable condition, the object being to get the crop in as early as possible, though not to the neglect of other crops. The harrow is passed over the ground after the plowing is completed, and the seed is sown about the middle of April, and from that time to the first of May.

* Though it is probable if the ground were plowed in the fall and replowed in the spring it would be better, especially if the soil is at all stiff and compact; a thorough pulverization being a desideratum.

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It is commonly the earliest sowed of any crop except spring wheat, as it is not liable to be injured by the late frosts of spring, although in some few instances, injury from this cause is thought to have been experienced: and late crops are more subject to rust.

295. *Seed.*—With no other crop does strict and incessant attention to the seed seem to be so necessary as with this. Nor does good seed of any of our other cultivated plants appear so liable as flax seed to deteriorate in a short time. An instance is related of a kind of seed introduced into one neighborhood, which five years ago was about the choicest seed that could be procured; the crops from it being large and of the best quality. But already it has degenerated so that it no longer produces such crops as it then did, and other kinds of seed are now preferred to it.

Our farmers generally pay too little attention to this subject, each sowing from his own seed year after year. An attentive examination of this matter would undoubtedly detect several distinct varieties of flax among the crops that are cultivated in this district, which varieties are caused by the different kinds of seed that are in use. Thus one man is reported, who for several years has brought flax to the machine, of a short staple, and a "towey" quality, that is, an unusual proportion of tow is whipped out of it by the machine, making the yield of dressed flax unduly small. The flax of another man has also been observed through successive years to be of a long staple, but of a yellowish color and of a harsh rough texture, the quality being miserable although the yield is fair in amount. The farms of both these men are situated in neighborhoods known to possess the best of soils for this crop, and from contiguous farms, flax of an unexceptionable quality is obtained. The peculiarities of their crops therefore cannot be ascribed to the soil on which they are grown. And the most plausible supposition is, that these peculiarities are owing to the seed they use.

Such an accurate knowledge of the relative qualities of the several crops raised by our farmers, can be obtained in no other instances, as what the owners of flax mills obtain with regard to this crop. Year after year is brought to them all the flax grown in their district, in dressing which, they soon become well acquainted with the quality of the flax which each farm produces, and nobody is so well qualified as they to give valuable advice to the farmer as to when his seed requires to be changed, and where he can procure the best that is to be had in the vicinity. Comparatively little is known to my informants on this subject. They are unaware of any peculiarities of situation or soil, as producing seed of particular excellence. Long Island seed used to be much used

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here, at present what is called the "Sapling seed" is in much repute, particularly as producing flax of a taller growth, than any other kind of seed among us; but of the origin of this variety, I have no definite information.

296. *Quantity of seed sown.*—Whilst flax seed continues to bear its present price in market, the production of seed will continue to be a prominent object with our farmers.

Some think 2S quarts of seed per acre better than more, but a bushel, slightly less, rather than more is the quantity usually sown.

The seed ought to be of the best quality that can be obtained; and perfectly clean and free from any other seeds.

It is important that the seed should be as evenly sowed as possible, and to insure this, many of our farmers are accustomed to cross-sow the ground; that is, one half the seed is sowed (broadcast,) by passing over the ground in one direction, and the remainder, by passing over it again, at right angles with the tracks previously made. If a thin spot occurs, there the flax will grow long and coarse, and if a thick spot is in the piece, there the staple will be short and fine; hence the importance of having the seed scattered as evenly as possible over the entire piece. And here also the disadvantage of rearing flax upon the ground where for drainage, the land requires to be laid in ridges with intervening dead furrows. An even crop of flax cannot be obtained from such ground.

To insure as even a distribution of the seed as possible it is important that the ground should be well harrowed before sowing, so that all traces of the furrows left by the plow may be obliterated, and the whole surface be as smooth as possible; where this is not the case some of the seed gets covered too deep, and consequently is longer in sprouting and growing; thus producing an unevenness in the diameter and length of the stalks that is to be avoided.

The seed is commonly covered by the harrow. This does the work very well; but still is liable to cover some of the seeds too deep, and others not sufficiently. The seed requires to be but slightly and evenly covered. Hence some practice bushing it in—and decidedly the prettiest implement in use with us for this purpose is formed by inserting the butts of a number of beech or other brushy limbs into holes bored in a piece of light scantling—a brush of this kind giving that slight even covering to the seed that is obtained from no other implement.

297. *Top dressing with plaster.*—When the flax is about 2 or 3 inches high, it ought invariably to have a top dressing of plaster, unless from the richness of the soil and the appearance of the young plants, there are apprehensions of too rank a growth; in which case the plaster should be

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omitted. This top dressing is the universal custom in this district, about a bushel of plaster being sown to an acre of flax. Instances too are related in which unleached ashes have been used to the quantity in one case of 8 bushels per acre, with an excellent effect. Many years ago it was the practice to sow the outer edge of this crop with ashes to protect it from the worms which it was supposed crept into the flax from the adjoining lands; and it was often observed that here upon the ash-dressed border, there was double the quantity of flax that grew elsewhere.

298. *Weeding*, never attended to here, and our flax growers are decided in the opinion, that high as labor is in this country and the little detriment the crop receives from weeds, and the trampling down of the flax that will be made by a thorough weeding; for them to practice this measure as recommended in agricultural works, would be money out of pocket.

299. The following are the weeds which chiefly infest the crops of flax in this county.

1. The *yellow seed* as it is universally called with us or False Flax, (*Gomelina sativa*, Linn.) seems to be the natural associate of flax, as chess does of wheat, insomuch that we wonder the believers, in transmutation have not swallowed the crudity, that flax changes the yellow seed, and that the Bible is not true when it says every plant was made "yielding seed after its kind." Diffused as the seeds of this plant now are in our soil, it comes up in fields where the cleanest flax seed is sown; and where patches of the flax have been ate off by worms or destroyed from other causes, it is common to see the vacancy fully occupied by this officious intruder. [It has rather a stiff erect round stalk, from 6 to 10 inches high, branching and scattered along the ends of the branches bearing several little white flowers which come out in June and July, and produce plump little pods the tenth of an inch long, each containing two light yellow seeds the size of a mustard seed.] One of these weeds will occupy the room required for three or four stalks of flax, and it is *solely* in consequence of its thus diminishing the quantity of flax that would otherwise be produced, that it is detrimental. It is no impediment to the dressing of the flax, nor does a considerable sprinkling of its seed among the flax seed, form any objection on the part of the buyer; a given quantity of this seed yielding about as much oil as does the same quantity of flax seed, and of as good a quality it is said.

The screenings of the fanning mill collected in the box often consists almost entirely of yellow seed; this is taken to the oil mills, where it is cheerfully bought for about half the current price of flax seed. Hence,

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although our farmers take some pains to avoid introducing this weed, they do not regard it as so detrimental as to wage open war against it.

300. Another weed (*Lepidium campestre*, Linn.) is quite common among flax. This is co-generic with the pepper-grass of our gardens and the name *pepper-wort* is given to it in botanical works though our farmers have no name whatever by which they call it. It is probably by mistake that the name yellow-seed is applied to this instead of the preceding species in some of our botanical text books. It is a more dwarfish plant than the preceding, has very small white flowers, which produce plump little pods, each containing two seeds somewhat like those of mustard and cabbage.

301. A weed far more troublesome than either of the preceding, and regarded as the worst of anything that gets among our flax, is the *Knot Bindweed* (*Polygonum Convolvulus*, Linn). This is a vine growing to a length of from two to six feet, with leaves and seeds closely resembling those of the buckwheat though much smaller. It always grows from seeds that were lying in the ground, it being so readily seen and removed from flax seed that it is never sown with it. Occasionally fields of flax are much infested with it. It twines itself about among the growing flax and in pulling the crop it clings to the stems and roots so that it cannot be removed and is necessarily bound up with them, and becomes a great annoyance in dressing the flax.

302. Our farmers seek to avoid having these weeds in their crop as much as possible, by sowing upon clean ground and using clean seed. Beyond this they make no exertions to subdue them, for the reasons already stated. There is one weed further however, that ought invariably to be combatted, although very few pay any attention to it. This is the well known Canada Thistle, which sometimes comes up in fields where flax is growing. In pulling the flax to avoid the bringing the hands in contact with these "unpleasant customers" a number of flax stalks are left ungathered around them, and in shunning them the laborer is also much retarded in the celerity with which he would otherwise advance. This loss far more than overbalances all the expense it would be to effectually obviate it. With a narrow chisel-like instrument, cut out say from the blade of a worn out shovel, and fastened to a handle a few feet in length, the flax crop should be passed through when it is five or six inches high. The thistles are then readily seen; with the instrument just mentioned, every stalk should be cut off slightly below the surface of the ground. This operation can be rapidly and readily performed. The top thereupon withers and disappears. And although new shoots come forth from the root, they are stinted in their

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growth and the flax over tops them so far when it comes to be pulled, that they cause no impediment in the operation. In fields where it is known that the Canada or other thistles are liable to come up, no farmer should fail of resorting to this simple and effectual mode of warding off the loss they will cause him if permitted to grow unchecked.

303. The only weeding commonly practiced by our flax growers, is upon a small part of their crop; the part from which they purpose saving seed for their future use. This is almost invariably weeded, and to ensure its being effectually done, the part selected should be gone over twice or thrice whilst the flax is growing. When it is but two or three inches high the yellow-seed weed can be plainly distinguished from the flax, and should then be removed, with all other weeds that have made their appearance. If this work is delayed later than this, these weeds are impeding the free growth of the flax; and the taller the flax becomes the worse it is trampled down and tangled by the walking among it which it experiences in the process of weeding. If carefully weeded at the time above specified it requires to be but slightly passed through once or twice afterwards, for the removal of any stragglers that were overlooked in the first instance, or that afterwards shoot up.

304. DISASTERS, *Worms.*—We proceed next to specify the other disasters to which the flax crop with us is subject.

Just after the plants have sprouted they are liable to be attacked by a cut worm which from the little information I can gather respecting it (for I have never seen it) appears to be a species analogous to the cut-worm that infests our corn; like a true epicure it carefully selects the flax plants to feed upon, and leaves the yellow-seed and other weeds unharmed. In one instance I observed an acre of ground entirely covered with yellow-seed, with only here and there a stalk of flax; and was told the true flax had sprouted finely; and the next the owner knew, it had all disappeared, and nothing but this false flax was growing, although clean flax seed had been sowed. The loss was attributed to the flax plants having been ate off by worms. A case like this however is extremely rare.*

* Commonly only a small patch or two, it may be a rod or more in extent will have the flax taken nearly clean from it, whilst the remainder of the field does not appear to be in the least affected. Some say the outside of the field is most commonly the part that is destroyed; and though the worm commonly attacks the crop soon after it has sprouted, instances are related to me in which stalks a foot high have been ate off by them. If this be the case, it is quite probable that there is more than one species engaged in this mischief. The injury, however, which is sustained from this source, is as yet of trifling account. The flax crop is by no means so liable to be attacked by cut-worms as our corn crop is.

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305. *The Flax Rust.*—The disaster of which we come next to speak, is altogether the most baleful of any to which the flax crop in Eastern New York is subject. And yet in but a single instance do we find any allusion to it, in the botanical and agricultural works which we have at hand, though some of these latter profess to treat of "all" the diseases and casualties to which this crop is liable.

In the Transactions of the Society of Arts of the State of New York, vol. 2d, pp. 185, 187, is a short article from the pen of the Hon. Ezra L'Hommedieu, entitled "Description of a late disease in flax on Long Island, in which we are informed that this disease first commenced in the town of Bridgehampton, near the east end of that island, about the year 1803, and the following year extended eight or ten miles further, and within two years thereafter was all over the eastern part of the island," so that there is but little flax raised. In 1806, the same disease attacked the crops in Pittsfield and Richmond, Mass. It is described as a small black speck about the size of a pin head, sometimes with a slight black streak about half an inch long proceeding from it; and this spot, it is stated, comes only upon or near the middle of the stalk, and does not make its appearance till the flax is pulled and dried. We think this description is drawn from specimens in the incipient stage of their growth, or else that at that early day the disease had not developed itself so far as to put on the marks it now wears. On being dressed, the flax stalk it is so stated, breaks in two where this spot appears; and though the affection was popularly regarded as a kind of mildew, Mr. L'Hommedieu thinks it more likely that it proceeds from the sting of an insect, which lets out the sap or juice, and rots the stalk in that part, though he had been unable to detect any insect which he could regard as producing this wound.

306. We proceed to give the facts that are within our knowledge, respecting this disease.

The "flax-rust" as it is termed by our farmers, seems to prevail more in some years than in others. In 1846, several fields were badly injured by it. The past year, 1849, which was noted for its drouth, there was scarcely any of it. Upon one point, our flax-growers generally concur. Where it does appear, it is almost invariably upon flax growing upon land that has been fertilized by artificial manuring. It would hence seem that a rank, luxuriant growth, such as an unduly rich soil produces, was a prominent exciting cause of this malady. Crops of flax, moreover that are unusually late, seldom escape. Gen. McNaughton, of Salem, relates to me a notable instance, illustrating this fact. An old resident in his neighborhood, though a very worthy citizen, was al-

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ways behind-hand with his work, so that he was never known to get his flax sown until some time in the month of May; and he was never known to have a crop but what was badly rusted—this disease commonly making its access after the patches of flax on the adjoining farms had all been pulled.

It is a little before the flax is gathered, that this malady usually makes its appearance. The earlier the attack, the greater is the injury. If it does not come on until just as the flax is being pulled, it is believed that it causes but slight damage. It comes in the form of black spots, looking as though a small drop of tar or some such substance, had previously been put upon the stem, and had spread out into a thin pellicle, concreting upon and adhering to the surface. If these spots have any different appearance in the incipient stages of their formation, none of my informants have observed it. They appear mostly upon the upper and branching parts of the stalk, but are sometimes scattered *along its* whole length; and wherever one of these spots appear, it rots off and destroys that part of the fiber of the flax with which it is in contact. If the spots are only at the top of the stalk, the injury is but slight; but when a solitary spot occurs any where near the middle of the stalk, every fiber with which it is in contact is lost; for the reason that, when the flax comes to be dressed, as it is held under the knives of the dressing machine, the upper part of all those fibers which have been cut asunder by the rust-spot, is whipped out among the tow; and when the operator turns the handful to dress its opposite end, the remaining part of these same fibers is similarly taken away. Hence a spot of this mildew reaching half round a stalk near it middle, occasions a loss of half the fibres in the stalk; and this seems the more lamentable; because these wasted fibers are good flax, except the minute portion that was covered by the rust. As an example of the loss that is sometimes experienced from this cause, the following may be related. Anson Collins, of Jackson, in 1846, sowed an acre of flax beside his barn, where the soil, it is evident, would be in a high condition as to fertility. It grew finely, and from its thrifty appearance, there was no doubt it would have yielded over two hundred pounds of dressed flax. But the rust invaded it, and from this cause alone, forty pounds was the entire product of the piece.

I have had no opportunity of seeing this disease in the growing flax. A few specimens of it, however, found after much search upon dried flax, are now before me. These I am assured, exhibit perfectly the usual appearance of this disease. The spots are about one-fourth of an inch in length, and reach about half way around the branch of the

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stalks on which they occur. They are of a coal black color, their edges well defined and visibly elevated above the level of the contiguous bark. A magnifying glass shows that the epidermis or thin outer bark is unbroken, but is nearly raised up, as it were in a blister, which has become black and gangrenous. There is no doubt, therefore, that these specimens are immature, and that had the flax stood a few days longer, the epidermis would have been ruptured. Enough, however, is shown by them to clearly indicate the nature of this disease. It is obviously a parasitic fungus of the group CÆOMACEÆ, or dust Fungi, of naturalists; and though its generic marks cannot be fully seen in these specimens, I have scarcely any hesitation in referring it to the genus *Puccinia*. In all the points of its history as above narrated, the reader will have perceived a close analogy between this and the common grain-rust, (*Puccinia graminis* of authors,) which so frequently attacks our oats, wheat, &c. But this flax-rust is evidently a distinct species from the grain-rust. All the best authorities discountenance the idea that the grain-rust ever attacks any plants except those pertaining to the grain and grass families. That appears moreover, in the form of long narrrow spots, whilst here the spots are broad, oval, and with rounded, or irregularly sinuated ends. The characters herewith adduced are ample for distinguishing this species from the grain-rust, and from the several other species of blight and mildew of which I have any knowledge.* The name *Puccinia Lini*, literally meaning the *rust of flax*, is therefore proposed for this species, and a more definite description of its structure is reserved, until it has been examined in its growing and matured state.

307. To render this subject more plain to the general reader, it may be observed, that the rust-spots on flax, as on other plants are occasioned by clusters or tufts of exceedingly minute mushrooms, which take root among the fibers of the inner bark, and by their growth raise up and distend the epidermis until it bursts; whereupon their seeds escape and float off in the atmosphere, or settle to the ground. How these nearly infinitesimal seeds find their way into the plant to there vegetate, is not conclusively ascertained. The most plausible supposition appears to be that they are disseminated in the soil from whence they are imbibed by the roots of the plant, and are carried upwards by its juices, until they reach the appropriate places for them to grow. Drawing their nourish-

* How numerous are the kinds of rust, blight, smut, &c. which infest the vegetation of this country is indicated by the fact that that distinguished botanist, the late Rev. L. de Schweinitz, in his "Synopsis of North American Fungi," published in the Transactions of the American Philosophical Society, vol. 4, pp 141-316, enumerates as known to him forty-two species of *Puccinia* and a yet larger number pertaining to each of the allied genera, *Uredo* and *Aecidium*.

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ment from among the fibers of the flax, that portion of these fibers which is thus exhausted, withers and decays. Yet if the fungi have only commenced growing when the flax is pulled and dried, their further growth is arrested, and the fibers in which they have nestled are then but slightly disorganized.

308. From the facts that have now been related it appears that the main safeguard against this malady, is early sowing upon ground that is not fertile to excess, especially from raw animal manures.

Where, from the vigorous growth of the flax, there is reason to fear it may be invaded by the rust, as the period for gathering it approaches, it should be closely watched, and that part of the field particularly examined where the crop is most luxuriant. And if it is discovered at any time that this blight is making its appearance upon the stalks so as to threaten serious injury, the crop should be pulled and dried without delay. Thus the loss which is otherwise inevitable, may be averted. There is but one consideration that will cause any one to hesitate in adopting this course, and that is the diminished amount of seed that is liable to be obtained if the crop is prematurely gathered. The rust, however, does not commonly make its appearance until near the time for pulling the flax, when most of the balls are so far advanced that the seed within them will ripen, though they are more immature than is desirable. The loss in the seed will therefore in most cases be small compared with the loss that will be sustained in lint if the crop remains many days ungathered after this malady makes its appearance.

Another species of rust is said to have occurred in some instances, presenting the appearance of a red or yellow powder dusted over the whole plant, and causing a total destruction of the crop. But beyond this general fact I have no definite information respecting it.

309. *Lodging.*—This is one of the disasters to which the flax crop abroad is so much subject; insomuch that in some countries it is a common practice to place among it poles elevated upon short crotches drove in the ground, to sustain it from falling. But in the present mode of cultivating flax here, it is little liable to this disaster; the thin seeding allowing a more robust growth of the stalk, whereby probably it obtains such a degree of rigidity as to preserve its upright posture, or recover it when it has been prostrated by storms; for it is common to see the flax of our fields at the close of a shower all lying flat upon the ground weighed down by the wet, which evaporating, the stalks recover their erect position, and next day stand as upright and smooth as though nothing of this kind had occurred. Some of our other crops, oats for instance are much more liable to lodge. These two crops are often rear-

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ed side by side in one field, each thus growing in the same soil and exposed to the same influences and in such situations the oats will be sometimes seen badly lodged in spots or even over the whole field whilst the flax is all standing upright and smooth.

It is common to pull spots of flax that become badly lodged sooner than the remainder of the crop, lest it becomes injured by mould or other cause; and the only detriment which this casualty causes with us is that the pulling of it hereby becomes a more tedious and fatiguing process.

310. *Pulling.*—The marks which indicate the proper time for pulling this crop, will vary according to the object for which it is reared—whether for the lint alone, the seed alone, or both the lint and seed. Where it is thickly sowed, and the stalks stand very close, the lower part of the stalk will begin to turn yellow, and the leaves here will wither and fall earlier than where thin sowing causes the stalks to stand farther apart, and allows more light and air to circulate around their bases. In the mode and with the objects for which it is at present raised in this district, the best criterion, by which to judge when it should be pulled, is drawn from the perishing of the leaves. The leaves at the top of the stalk it is well known, continue green and vigorous after those toward its base have withered and dropped off. And the best time for pulling the flax, is said to be, when all the leaves have fallen from the *lower half* of the stalk. The bottoms of the stalks are at the same time a little yellow, and the bolls which envelope the seeds are also beginning to change in color; though some late flowers will still be found upon them. But after all, this is a point on which there is no occasion for being over-nice. Where one has a quantity of flax to pull, he will begin somewhat before the period indicated, and probably not finish till after it.

Of good clean flax, three men will pull an acre in a day. Where it is lodged or infested with weeds five days labor may be required on the same quantity of land. This work is commonly done the latter part of July, and sometimes in the fore part of August. It thus comes in the midst of the most hurrying season of the year. But no one of ordinary foresight experiences any material inconvenience in attending to this crop in conjunction with the others, that about the same time require to be gathered.

311. *Drying.*—The quantity of flax that can be held together in one hand, as it is gathered is tied into a bundle with a band got by pulling up some of the short stuff that is scattered around on the ground that has been passed over. From 10 to 15 of these bundles as they are made, are set together in a round stook to dry. They thus remain until they

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are as dry as well cured hay; so that there will be no danger of their injuring when piled in a mow. This requires about a week of good weather. Then they should be drawed to the barn or elsewhere, where they can be placed under cover. Some let them remain in the field much longer than this, under the idea that the dryer they become the more easily can the bolls be thrashed. This I am assured is a mistake. The bolls break and open more readily it is said when merely sufficiently dried to preserve, than they do after they have been exposed to the weather for a number of weeks. It is a good plan ere removing them from the field to tie each stook, together by a band of rye straw, thus uniting the 10 or 15 bundles of the stook into one. This prevents the flax from pulling and tangling together as it is apt to do when the several small bundles are handled separately.

312. *Thrashing.*—The flax remains under cover till the hurry of haying and harvesting is over. Then by leisure spells the seed is thrashed from it.

For this purpose a large block of wood or a flat stone, is commonly placed in a slightly inclined position, at an elevation of about 20 inches above the floor of the barn. A cast iron scraper inverted, and raised on blocks is a still better apparatus for this operation. Each bundle is taken separately and whipped over this, till the bolls are all broken and the seed dropped off, the operator standing at the most elevated side of the stone. A man will thus whip off a large load or about the yield of a half or three-fourths of an acre in a day. Some are in the habit of removing the upper concave cover of a thrashing machine and holding the ends of the bundles on the thrasher, whereby the seed is more speedily removed; but this cuts off the ends of the bundles, thereby making them shorter, and pulls out some of the stalks, so that more it is said is wasted in this mode, than will pay for the additional time required in the process previously described. A comb made like a rake with long close teeth through which to pull the top of the bundle is still more objectionable, as it inevitably will draw out and waste many stalks from the bundles. No mode preserves the bundles so perfectly and wastes the flax so little as whipping, which is the general practice.

The bolls, chaff and seed, are now passed through a fanning mill which separates four-fifths of the seed. But many unbroken bolls, and others in which the seeds still cling, fall immediately back of the mill. These are thrashed with a flail, and again passed through the mill; and this operation is repeated till all the bolls are broken and the seed separated from them. The seed requires to be twice passed through a good mill to clean it sufficiently for market. A poor mill will not answer for this work. Van Winkle's mills manufactured in Wayne Co. and

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extensively introduced in this vicinity within a few years, are very good for this business, as are also the mills made by Mr. Grane in White Creek. Every mill requires a seive purposely for cleaning flax seed, wove with long narrow meshes to separate oats, buckwheat, and any other large seeds from those of the flax.

The chaff from the flax seed that our farmers have been accustomed to throw away as valueless, is of late beginning to be carefully saved for horse feed. One man who has used it much for a few years, says the chaff from less than 200 bushels of seed is amply sufficient to keep a horse that is not at hard work, in good condition through the winter, without either hay or grain. Another relates, that when his flax seed was being cleaned and the chaff thrown into the yard, a horse running in an adjoining pasture where the feed was abundant, was observed to hang about the barn continually for several days, eating this chaff, to the entire neglect of the pasture, a strong indication of the fondness of the animal for this species of food.

The seed is commonly disposed of soon after it is cleaned, either to buyers that pass through the country at this time, or taken by the producer to one of the oil mills in the vicinity, or to Lansingburgh or Troy, where it meets with a ready sale. And there is often this great convenience in this article, that it can be readily turned into money, earlier than almost any other farm product of the season, and at a time when the farmer's purse is commonly more empty than at any other period of the year. The oil mill at the valley, in Schaghticoke consumes the largest part of the seed at present produced in this county; the Bennington mill receives some, and the remainder passes to the city market. For five years past the current price of flax seed has been from $1.05 to $1.19. On account of the high price of linseed oil, for a time in the autumn of 1849, the price paid for flax seed was $1.37½. The oil cake that is produced at the mills is taken to the cities, none of it being at this day used here in the country.

313. *Rotting.*—About the middle of September, the flax is taken from the barn to be rotted. It is drawed to a piece of smooth meadow or pasture land, from which stock of every description can be excluded for a time. It is here unbound and evenly spread in rows, the tops of the flax all being kept in one direction, and the rows only so far separated from each other as not to interfere or become entangled together. To be thus spread, it occupies about three quarters of the same amount of ground that it grew upon; though the thinner it is spread the better; and if spread rather thick, it requires to be turned when about half rotted. This is accomplished by running a light smooth pole under the

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rows and gently raising the tops and turning them over to the opposite point of the compass.

In no part of the management of this crop is experience so necessary to guide one, as in deciding upon the exact point when the flax is sufficiently rotted. If not rotted sufficiently, the fibers are not so strong, or rather probable, they are more rigid, and hence break asunder from not possessing a due degree of pliancy. Out of the same lot of flax, a portion that was taken up *too soon*, was more broken and wasted by the knives of the dressing machine, so that it produced less in quantity, and moreover when taken to market the purchaser made a difference of a cent per pound in the price he gave for it. A judgment upon this matter is formed by taking a stalk here and there from the spread flax, and with the fingers breaking up portions of it an inch or more in length. If the woody part or shives are not brittle, breaking and shaking out readily, it is not rotted enough; and when they thus break and shake out freely if on holding the stalk between the thumb and finger of each hand and giving a smart twitch upon it, the fibers of this broken part snap assunder, it shows that it is rotted too much. Indeed in this matter the flax grower is in a dilemma amusingly similar to that of a certain lover of the bottle formerly well known in this district, who used to remark that in drinking, he could always tell when he had not got enough, and he could also always tell when he got too much, and yet, for the life of him he never could determine when it was that he had exactly the right quantity!

So much in doubt are even experienced men upon this point, that some of them do not feel perfectly certain, until they have taken handfulls of the flax to the dressing machine and by there skutching it, ascertained whether it had reached the precise state that was desired. All that can be definitely told by words is, that as soon as the woody matter of the stalk breaks readily and separates easily from the fibers of the flax, it is sufficiently rotted. The length of time required for this, depends wholly on the weather, and varies from two to six weeks. Warm wet weather accelerates it the most rapidly; and the earlier in the season it is spread, the quicker will it rot, in consequence of the weather then being more warm than at a later period. But flax that is quickly rotted is no better in quality than that which is more gradually rotted. One fact appears singular, but is currently and confidently stated to be true, viz: that flax cannot be well rotted in the spring of the year. One man spread out a quantity just after the snow had disappeared, and allowed it to remain two months, without getting what is called "a good rot" upon it then. Other kindred instances are remembered. It is difficult to conceive why the same amount of humidity

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and warmth in the spring should not produce the same effect then that it does in the autumn. Still when the annual vegetation of the year is hastening to decay, it is not improbable that a "leaven" is diffused through the air, favorable to this process, which does not exist in the spring.

As soon as the flax is ascertained to be sufficiently rotted, it is tied up in bundles, of a size rather larger than the sheaves of oats. Straw is sometimes used for the bands it being easier upon the hands in binding; but it does not preserve the bundles so smooth and even. Flax therefore is commonly employed. This causes no waste, as these bands when taken off are placed in with the bundle and dressed. If suitably dried when it is bound, it requires no further drying or even airing to prepare it for being dressed. Some persons have made trial of water rotting in different ways and vats and every appliance to insure success has been resorted to, and these have all been abandoned and dew rotting returned to, with the conviction that it was the better process of the two; in which opinion I am told the Schaghticoke manufacturers decidedly concur.

314. *Dressing.*—The flax dressing machines of our county are all placed upon brooks, too small to be of any account for mills or other machinery. They are with one or two exceptions, in operation only about six months of the year; at which time these brooks afford an ample supply of water for their purposes. There are six or more of these machines in Cambridge, three in Jackson, and others in White Creek and Easton. They commonly begin to run in September or October, and continue till into April. The price for dressing it is $2,00 to $2,50 per 100 wt.; or it is dressed for one third of the flax which it produces. At present prices the flax growers all prefer having it dressed at $2,50 per 100 weight instead of on shares.

Laborers residing in the neighborhood of the machine, are commonly employed to dress the flax at $1,50 per hundred weight, they boarding themselves. One man will dress 50 weight per day on an average; but this varies greatly, depending particularly on whether the flax is well or poorly rotted. From some lots, 100 weight per day can be dressed; and on the other hand, an instance is related in which three good dressers, with their utmost diligence were able to average but 15 lbs. each per day. Flax thrashed of its seed and rotted, is bought by the owners of these machines at $6 and $7 per hundred wt.

315. Dressed flax has for several years past been worth from 8 to 10 cts. per pound in market. The largest part of what is grown in this county is taken to Troy, where it is bought for manufactories in New England. Much of it however is used in the factories at Schaghticoke

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Point and the Valley. It is only for the coarser purposes of twine, canvas, and ropes, that our flax is in demand; consequently there has been no incentive for the growing of fine flax. The market has been supplied with an article of the quality which it called for. A manufactory however is now erecting north of Lansingburgh, for spinning linen thread which will probably cause a demand for a finer staple than has hitherto been grown here; but which assuredly can be produced, as soon as sufficient inducements are offered for its production.

As the owners of our saw-mills claim all the slabs made from the logs they saw, so the owners of our flax machines claim all the tow that comes from the flax they dress; and this forms an important item in the income of these establishments. The tow produced is of two qualities, fine and coarse. The fine tow consists of the flyings of the mill, that settle around and that are quite free from shives. This is worth two to three cents per pound at the Schaghticoke mills and is used more particularly for making sacks for holding cotton and wool. The coarse tow is what has shives adhering to it, and which drops more immediately around the knives of the machine. The loose shives being mostly shaken out from among it, it is taken to the mills in Schaghticoke, and sold for about one cent per pound. It is here put through a picking machine constructed for the purpose, by which the shives are separated and shook out of the tow, thus adapting it for being spun into ropes, &c.

The amount of tow of the two qualities, obtained from a given amount of flax, is indicated by the following facts. The dressing machine of Alex. Small of Jackson, in the winter of 1848–49, turned out 18,000 lbs. of dressed flax, in doing which about 1,800 lbs. of fine tow and 6,000 lbs. of coarse tow were made.

Estimates of the cost of rearing, and of the profits which the farmer ordinarily derives from this and other crops, will constitute a separate topic to be considered hereafter.

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PART FIFTH.

TOPOGRAPHY OF WASHINGTON COUNTY.

316. *Introductory observations.*—The topography of this county is so fully shown in most of its details upon the map herewith presented, that with the mass of matter we find we have to present upon other topics, we are constrained to treat this with the utmost brevity. We do this with the less regret, since in a serial work entitled "Gazetteer of the County of Washington," now publishing at Schuylerville, by A. Corey, editor formerly of one of our county newspapers, much information upon this subject is being made accessible to the public. Omitting therefore all notice of the relative situation, boundaries and extent of towns, the course and connections of streams, and in short everything which may be learned from the map, we merely add a few items necessary to render more complete the information which it presents.*

317. *Situation and extent.*—Washington is an inland county of the state of New-York, situated on the eastern boundary of the state near its middle. Centrally it is 200 miles distant from the city of New-York and 180 from Montreal, thus being nearly equi-distant from and on the

* It will be seen that this map, the construction of which has cost us some months of labor, exhibits the geography and topography of the county more fully and distinctly than could be done in fifty pages of printed matter. In constructing it, the map in Burr's valuable atlas was taken as a basis, but corrections and additions without number in the minor details, will be perceived on comparing the two. And the local names of all the streams, lakes, mountains, villages, prominent neighborhoods, &c., will be found entered upon this map. These names are necessarily of frequent occurrence in all parts of the body of this work, and to render the whole complete and intelligible such a map seemed necessary. That it is perfectly accurate at every point is not pretended. Such accuracy can scarcely be attained except by an extensive course of measurements and observations made with instruments upon every hill and along the course of every stream, a labor which years would not suffice to complete. It is merely presented as being perfect for all the purposes for which such a map is ordinarily required, and accurate so far as our own local knowledge augmented by particular inquiries of our land surveyors and others have enabled us to render it. An acknowledgment for important aid in this connection is especially due to surveyors William F. Baker of Sandy Hill and Moses H. White of Union Village. With regard to the mountains, ponds and streams along the northwestern border of the county, surveyors, hunters and others who have traversed that unfrequented district, assure us that no one knows them sufficiently to give their situations with any degree of exactness.

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direct route between these two cities. It adjoins the south-western side of the state of Vermont and bounds that state through about two-fifths of its entire length. It is sixty and a half miles in length, with an average breadth of less than a fourth of that distance. Its greatest breadth is at its southern extremity, its extreme south-eastern corner being 19½ miles due east from the Hudson river. From here to East Bay at the head of Lake Champlain it has an average width of 17¼ miles; and from this point onwards 18 miles to its northern extremity (which is a line drawn due east from the southern point of Roger's rock,) it has an average width of five miles, from the Lake George shore to the middle of the main channel of Lake Champlain, which are here its boundaries. Its area we thus estimate to be 834 square miles, or more than two-thirds the size of the state of Rhode Island. It will thus embrace 533,760 acres. The state census of 1825 gave an area of 516,500 acres of (as we infer) occupied or private lands; that of 1835 gave 486,083 acres. The last assessment returns to the county board of Supervisors exhibit it at 492,410 acres. The mean of these three returns is 498,331 acres, which we regard as the nearest approximation to the amount of lands possessed as private property, that we are able to obtain.

A full inquiry as to the amount of lands included in highways in the town of Salem shows the following results. The total length of the highways of the town is 80 miles. They are mostly fenced two rods in width; the turnpike is four rods in width; and including open tracts at the corners of roads, the play-grounds around school houses, &c., three rods in width may be assumed as the average amount of land occupied by highways and otherwise permanently open as commons. This would give 480 acres in Salem as common lands, or about one acre in 65.

We estimate as within the bounds of the county and covered by waters of Lake Champlain 6,400 acres. Hudson river 1,560; Kingsbury swamp (say 12 miles long and 1¼ broad) 9,600, and various minor tracts covered by smaller streams and nearly or quite irreclaimable marshes.

Upon these data, then, we regard the surface of the county as being occupied as follows:

Lands covered with water and by marshes,.....	27,229 acres.
" occupied by roads and in commons,.....	8,200 "
Unimproved private lands,.....	188,052 "
Lands under improvement, (census of 1845),.....	310,279 "
Total,.....	533,760 acres.

318. *Form of the county.*—It will be perceived that the main body of the county presents the form of an oblong parallelogram, 40 miles by 17½, to which is appended the narrow peninsula between Lakes George

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and Champlain, giving it twenty additional miles in length. This form of the county has resulted from its topographical situation and features, these making this form more convenient for its inhabitants than any other. Traversed as the county is by hills and vallies running in a north and south direction, the roads also run and the business communications of the inhabitants extend in the same direction. The physical geography of the county has given it the shape which it possesses. The two northern towns are many miles nearer the county seat of Warren county, at Caldwell, than they are to either of the shire towns of the county. Yet their business transactions render them so much better acquainted with the inhabitants directly south than with those west and south-west of them that they have always decidedly preferred their present association. They here feel themselves at home; they there would be among strangers.

Scheming politicians and greedy office seekers, to furnish an additional number of teats for their insatiable mouths, have sometimes broached the subject of dividing the county, and cutting it down from its present rank of respectability, into two petty and insignificant fragments. But the measure has been too repulsive to all except those who had strong personal interests to be subserved, to have ever been regarded with favor. With two county seats and divided into two jury districts, and with the clerk's office centrally located, the county emoluments are more evenly divided between different sections, and the inhabitants are better accommodated, than they probably can be by any other arrangement. The project of having a single court-house centrally located at Hartford or Argyle, has been frequently and zealously agitated, and by clandestine management has in more than one instance been nearly accomplished, occasioning much sectional ill feeling for a time. But the railroads now completed and in progress, by making the present shire villages so accessible to large masses of our citizens gives to this subject of discord a final quietus, and insures the permanency of the present arrangement.

319. *Its general features.*—As otherwheres stated, the broken and mountainous primitive district on the north-west border of the county possesses a character and is in a condition wholly unlike the remainder of the county. From Half-way brook and Wood creek, a level tract of open plain lands extends to the Bald mountain range of hills; beyond which the surface is everywhere undulating and diversified with gentle swells of land and hills of moderate height to the eastern boundary of the county.

The county is naturally divided into two sections. The northern section occupies the head of the valley of Lake Champlain, and comprises the towns of Granville, Hartford, and the north eastern portion of Kingsbury, and the towns north of these. The southern section occupies the northern extremity of the Hudson river valley—for though this river has its source far to the north-west of this county, its course from thence is amid the narrow defiles of a wild mountainous region, and it is no more than a mill-stream in size, till having united with the Schroon and the Sacendaga branches and descended the Great falls in Cor-inth (not Co-rinth as it is barbarously mispronounced in the vicinity,) and Glens falls, it comes upon the western boundary of this county, where, by a final descent of 76 feet at Baker's falls, it enters the valley proper. From hence to the ocean, it is a deep, quiet stream, a character

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the reverse of that which it previously possesses, and the hills here recede from its margin on either side, forming a well marked and beautiful valley, which extends with great uniformity in its features from Fort Edward village to the Highlands.

320. MOUNTAINS AND HILLS.—Between the main range of the Green mountains and the Hudson river are three parallel ranges of mountains and hills, viz:

1st. The *Taconic range*, which runs along the east line of this county immediately upon the Vermont side of that line. From Mt. Anthony in Bennington, it passes through Spruce (or West) mountain, Red, Equinox, Bear, Antonio, Rupert and Pawlet (two names given to one long mountain) to Haystack, east of Granville village. It is singular that this chain of mountains which are mere outliers of the Green mountain range, here shoots up into higher peaks than any points in the main range opposite to them, Equinox mountain being the highest point in all Southern Vermont, its elevation, according to Capt. A. Partridge's measurement, being 2915 ft. above the court-house in Manchester and 3706 ft. or nearly three-fourths of a mile above tide water. Though beyond the boundary of the county, these mountains constitute a most prominent and interesting feature in its scenery, looming up as they do, in majestic grandeur, all along its eastern horizon. And as winter approaches, their summits capped with snow a fortnight or more before it invades the low country to the west of them, are beacons which prompt every laggard husbandman, to hurry in with his last load of potatoes and his last shock of corn.

2d. The *Petersborough range*, best marked in Rensselaer county, but running also through this county, by Oak hill, the Jackson hills, the Pine hills in Hebron and Rogers' hill in Granville whence it passes into Vermont. The valley between this and the Taconic range, which includes the flats and plains about the villages of Cambridge, Salem and Granville, it may safely be affirmed is one of the finest agricultural districts in our country. According to the returns of the last national census, there is double the population and thrice the productiveness and wealth here, that there is in the corresponding valley along the east side of the Taconic range, where the rock strata are more primitive and the soil more silicious. Some facts serving to show the earliness and mildness of the seasons in this valley as compared with the adjacent districts will be given when we come to speak of the climate of the county.

3d. The *Bald mountain range*, which is more regularly and conspicuously marked in this county than is the preceding, extends by way of Bakers, Willards and Swains mts. and Louse hill, Bald mt., Riggs's and Shannons hills, Todd's, Bald, Bowen's, and Beacon* mts. to the Pinnacle near north Granville, Hatch's hill, and onwards into Vermont. A most extensive and beautiful view of the Hudson valley, the Saratoga plains and the Palmertown, Sacendaga and other portions of the Adirondack range beyond, is presented from several of these summits. The country between this and the preceding range is elevated and undulated, without any flats or plains, but contains some of the best agricultural tracts in the county, as in the neighborhood of Cambridge center and

*Also called the Pumpkin mountain, in consequence of its shape. Having a wagon road nearly to its summit, this conical peak is a favorite resort for pic-nic parties and for beacon fires by night on election occasions, party triumphs, &c., the light showing over 8 or 10 towns in this, Warren and Saratoga counties.

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Spragueto wn in Greenwich. But through the neighborhoods of Cossayuna lake and Coot-hill in Argyle, Belcher in Hebron and onwards through Slyborough in Granville it is quite too broken and rough to be so highly esteemed, as the native fertility of its soil would otherwise render it. A view of this Bald mountain range of hills, so fine that it has attracted the admiration of thousands, is presented upon the road from Sandy-hill to Fort Edward.

321. *Mountains towards Lake George.*—The mountainous district in the north-west part of the county seems to be in like manner made up of three ranges, the southern-most spurs of which shoot down to Halfway brook, one in the rear of the other, forming a marked feature in the fine landscape of mountain scenery that is seen to the west all along the main road through Hartford. But it is in passing through Lake George that this mountain scenery is beheld in all its beauty, and has rendered this romantic lake unrivalled in its attractions to the tourist from the earliest times. This district is the most elevated of any part of the county, the highest point within our bounds being Black mountain in Dresden. The last of these three ranges, the Battle hill range, reaching from Fort Ann to Put's rock is the most separated and distinct, and its highest summit, the Pinnacle as it is named, at the west end of Grass mountain, is about two thirds as high as Black mountain.

322. *Elevations.*—We subjoin the elevation of several points within and upon the borders of the county, comprising all we have been able to meet with upon this subject. The height of several of the more important points within the county having never been ascertained, in the early part of this survey barometrical measurements of some of these were made, instruments for this purpose having been kindly furnished for a short time by Prof. C. B. Adams then of Middlebury, now of Amherst college, our friend Thaddeus A. Culbertson of Princeton seminary, assisting in this work. We are also under obligations to Prof. Ten Eyck of Albany Academy for a copy of the observations recorded for that institution upon the same days. As showers passed over when some of the observations were made, the results are only given as approximations to exactness, which are far more definite and reliable than anything previously possessed.

Black mountain, Dresden, highest point in the county, above tide,	2,878 feet.
Willard's mountain, Easton, probably highest point in south part of the county,	1,605
Bald mountain, Greenwich,	912
Summit between Hudson and Champlain vallies, near Munro's meadows	891
Mount Defiance, (Spafford's Gazetteer,)	720
Pinnacle, North Granville,	694
Batten-kill at Vermont line, (Sargent's canal survey,)	502
Summit between L. George and Hudson river, (W. T. Baker,)	459
Eagle bridge, R. R. level, (S. M. Johnson's survey,) above terminus in Troy,	401
Sandy hill, central green and street, (W. T. Baker,) above tide,	288
Glens falls feeders, summit level, (W. T. Baker,)	270
Lake George, (Capt. A. Partridge,)	243
Half-way brook, 4 ms. west of county line, (W. T. Baker,)	229
Champlain canal, summit level, (Spafford,)	140
Hudson river, from Fort Edward to Fort Miller, (Spafford,)	110
" " " Fort Miller to Saratoga dam, (Spafford,)	92
Lake Champlain, (various authorities,)	86 to 90
Hudson river, from Schuylerville to Stillwater, lowest level in the county, about	75

Aware that many, knowing that extensive railroad surveys have just been completed through the eastern section of the county will be sur-

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prised to find here no statements of the elevations of Cambridge, Salem, and Granville, and no clue to the descent of several important streams that here enter the county, I am under the unpleasant necessity of saying, that requests both verbal and in writing have been made for this information, to which no replies have been received. Of the countless instances in the progress of this work, in which it has been necessary for me to solicit information of persons of all classes, from our officers of state down to the humblest individuals, this is the only one in which an immediate and most cheerful response has not been received. And why the desired information has not been furnished in this instance, I think persons of much penetration will be at no loss to divine.

323. LAKES AND STREAMS. *Hudson river.*—This noble stream, to which our state is indebted for so much of its revenue, can here be but briefly glanced at, in its economical aspects as connected with this county.

The Sandy hill dam, 8 to 10 feet high and 1200 long, causes the water to set back nearly to Glens falls. On the Washington county side of this dam is a saw-mill, grist mill and woolen factory. The saw-mill has two gangs each with 16 or more saws, cutting two logs (previously slabbed or flattened on two sides) at one run, and consuming about 200 logs per day when run all night as it is through part of the year, making therefrom about 2,000 plank. Pine, spruce and hemlock is the timber used, which is floated down from the upper Hudson. It gives employment to 10 sawyers and 5 assistants, and was built in 1844, costing $3,000. From hence in the river are rapids, a half mile to Baker's falls, 76 feet perpendicular. In 1790, a rocky island, 5 rods long, on which stood several large trees, was at the head of these falls, all traces of which have disappeared. Here are a grist mill and two paper mills, the smallest one consuming 400 lbs. of rags per day. From hence rapids extend to the back-waters of

Fort Edward dam, built in 1821 by the state, 27 ft. high and 900 long, to feed the summit level of the Champlain canal. Two hundred feet of it were carried away in 1822. Repairing this, and the original cost amounted to $92,000, say the builders. The Glens falls feeder superceded this in 1840 and it was sold in 1845 for $250 to the "Fort Edward manufacturing company," who cut it down to its present height, 16 feet. Two gang saw-mills, each with 25 to 30 saws, (exclusive of butting saws and circular saws for cutting the slabs into lath) can turn off 18 to 20,000 feet of boards &c. per day. A third mill, built in 1848, cost $10,000, has 49 saws, turning off 30 to 40,000 feet per day. A canal supplies water to a machine shop and furnace (employed on stoves and heavy castings up to 5 and 6 tons in weight) giving work to 30 or 40 hands and doing $20,000 amount of business annually; capital invested, $25,000. A flouring mill, a plaister mill and a cotton factory are similarly supplied, the last not yet completed, intended for 130 looms. The river from hence is deep and still, passing Munro's island, 42 acres; Bell's (at Black house) 3 acres; Taylor's, 70; Galusha's, 30; Payne's, 3; to

Fort Miller dam and falls, where is a gristmill, saw-mill, fulling mill, machine shop employing 3 to 5 men, plaster mill and woolen factory. From hence it is still and deep to Saratoga dam, 1390 feet long, where is a saw-mill. Hence to the Stillwater rapids it continues with a deep channel and but a slight current, and is 600 feet wide at the Easton ferries. It is crossed by bridges, at Fort Edward, (railroad track only), at

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Fort Miller and Schuylerville; the last 800 feet long, the first 1,006. Many families obtain most of their fuel from the drift wood of this stream, caught by slight booms along its bank.

324. *Batten-kill.*—This most valuable mill stream was found to run 7355 cubic feet of water per minute, above the mouth of White creek, in the extreme drought, last of July 1849, when all the streams of the county were noticed as unusually low. Arising in Dorset, Vermont, and receiving the Roaring branch from Sunderland, after a course of 20 miles, it enters this state, and runs 24 miles to its mouth, everywhere with a shallow rapid current, except where dams produce back-water. It is here crossed by 12 bridges (5 of them covered), each from 100 to 175 feet long. It at present supplies mills and machinery as follows, being nowhere occupied to a fourth the extent of its capacity.

Eagleville dam supplies a woolen factory, grist-mill and saw-mill.

Shushan dam, a woolen factory, grist-mill, 2 saw-mills.

Clapp's mill dam, a woolen factory, grist-mill, 2 saw-mills.

East Greenwich dam, 8 feet fall, a woolen factory, grist, saw and plaister mills.

Battenville dam, 9 feet fall, a cotton factory, grist-mill, and saw-mill. The first has 45 looms, employs 60 persons, half the number of females, and produces 8000 yards print cloths for calicoes per week. (This was in 1849. All these establishments have since curtailed or suspended their operations.)

Center falls, dam and falls 25 feet, cotton factory, grist-mill (6 run of stones, the others have but 3 to 5, and those on small streams but 2 or 3), and saw-mill. The first has 40 looms and 50 operators, producing (1849) 6000 yards of sheetings per week.

Union village dam, 8 feet fall, a cotton factory, gristmill, and sundry machine shops. The first is the most extensive establishment of the kind in the county. Wm. Mowry having become versed in the cotton manufacturing business at the pioneer establishment of Samuel Slater, Pawtucket, moved hither in 1804 and erected the first cotton factory in the state and one of the first in the country. It has been in operation almost constantly since, and what was deemed by our community a hazardous experiment has proved eminently successful, and formed the germ from which has grown the largest and most business village in the south part of the county.

Galesville falls, 40 feet, a woolen factory, 2 grist-mills, 2 saw-mills, 2 hydraulic cement and plaister mills.

Near the mouth of the stream, a high dam lately built, has a saw-mill and plaister mill. The Hudson sends a short branch into this stream near its mouth, called the Dwass-kill, a Dutch term, signifying a stream running both ways. A more curious instance occurs at the mouth of the Hoosic, where this Dwass-kill is a half a mile long, with rocky banks and ordinarily a rapid current, which no one would suspect could ever flow up stream, as it were. Yet by a sudden rise of the Hoosic, the current here has been seen running south in the morning, north at noon, and south again before night; and when the Hoosic continues high, this reversed course lasts sometimes two or three days.

325. *Dim-ondehowa* falls.*—These are the greatest curiosity of this

*This is the Iroquois Indian name of the Batten-kill, met with in several old documents, and uniformly written Dionondehowe, the orthography Saratoge, Ticonderoge, &c., being common at the same period. Whence I infer its orthography should be as above given, and its pronunciation with the antepenult accent-

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kind within the county, if not within this section of the state. They are a mile below Galesville. The entire waters of the Batten-kill and its tributaries being here gathered into one stream, in the course of some 300 feet make a descent of 75 feet. The first third of this distance is down four successive terraces, each narrower and higher than the preceding. The stream then rushes onwards to a narrow, deep chasm, which has been well named "the devil's caldron," and leaping over its ragged verge, plunges forty feet into the abyss below, where its smoking and foaming waters, tossed about and roaring as if with a madman's rage, jump and dash against the black walls within which they are pent, down whose steep sides trickle from every crevice milk-like rills which suddenly grow to torrents, as they are ever fed by the sheets of upthrown spray. Thus frightfully whirled and thrown from side to side in this terrific gulf whose gloomy depths are seldom reached by the sun's cheering rays, they at length find vent, and rushing hither, pour out of the aperture like the smoke from a furnace chimney, in rounded heaps, and resignedly drop into the quiet basin below. Could man produce such an exhibition as this, our whole country would flock to see it, nor demur at a high fee charged therefor. Yet thousands have grown to the meridian of life within a half a dozen miles of this spot, who have never beheld the sublime spectacle which nature here offers to their view without money and without price.

326. *White creek.*—This stream, named from the limpid clearness of its waters, is the largest branch of the Batten-kill, above its junction with Black creek, running 632 cubic feet of water per minute, at its lowest state, at the time already indicated. It arises a few miles within the state of Vermont, and is a wild rapid, mountain stream, crossed in this state by 8 bridges from 30 to 100 feet long. Of a score of mills and factories that have been built along this stream, the grist-mill and machine shop at Salem village are all that now remain, the neighboring kill being so preferable in consequence of its ample and never failing supply of water.

327. *Black creek.*—This also takes its name from the hue of its waters, much of which come from marshes, and run with a mild and gentle current, strongly contrasting with the preceding. At its lowest state near its entrance into White creek, it was found to run 504 cubic feet per minute. It supplies 4 grist-mills, a shingle mill and several smaller works.

328. *Summit and Cossa-yuna lakes.*—These furnish the only other considerable affluents of the Batten kill. Summit lake, locally distinguished as "The Little lake in Argyle" is the most picturesque expanse of water within the county, and is singularly situated upon the very summit of the Bald mountain range of hills. Two saw-mills are supplied by its outlet. The other is the largest body of water within our county, being three miles in length and in its beauty is only surpassed by the preceding. It is sadly in want of an established name, having been called Long lake, Seybrant's lake, McEachron's lake and Cowans lake, all of which names have become obsolete, and it is now colloquially distinguished only as "The Big lake." I think all will concur in the propriety of returning to the original designation, which the early settlers received from the Indians, and which was more or less current for forty

ed—Di-on-on-*deh*-o-wa, and not Dionondeho, as some, I see, are inclining to write it, hereby robbing the word, I fear, of half its euphony.

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years; a name already "known to song," as every one is aware, in whose memory lingers any fragments of the old ballad, reciting the sad reverses of a certain love-lorn swain, and commencing with the stanza,

"'Twas at the Cossa-yuna lake
Oh there we had a caper,
And John being there among the rest
He met with Amy Naper."

This name (which became variously corrupted and "Yankeefied" into Quassa-juna, Quasia-junia, &c.,) literally implies, as I have been told by Indians of the St. Francis tribe, the lake *at our pines*, co-*os* or co-*woh* being their designation of the white pine. Nothing could be more expressive of the original scenery both around this lake and along its outlet, which was formerly called Cossa-yuna river or creek, but is now without a name. Upon this stream at Lakeville, are a grist-mill and two saw-mills. The pickerel (*Esox estor*) of Lake Champlain was introduced into this lake in 1834, where it multiplies and thrives astonishingly, making this lake a favorite resort of fishing parties from all the surrounding country. The largest specimens taken has weighed 17½ pounds, and 3 to 10 pounds are their common weight; sold at 10 cents per pound. The neighboring villages are supplied herewith during the latter part of winter and spring, and some of the residents upon the borders of this lake realise fifty dollars or more from this source each season.

329. *Moses kill.*—This stream (Moss's kill in the Sexagenary, and probably the name has thus come, Capt. Moss having been the first settler opposite to its mouth) is one of the most meandering within our knowledge. It is said that following its course thirty miles up takes one but seven miles in a direct line from its mouth. It has an interesting fall, descending in six rods 30 feet, half of which is a nearly perpendicular cataract. It is only occupied at Argyle by a grist-mill and woolen factory and one of its branches supplies water for two grist-mills and a saw mill.

330. *Wood creek.*—This descriptive name was given to this stream, not so much from the timber growing along its banks as that sank in its bed, which excessively discommoded the early voyageurs, and led to its being named by the Canadian French *Riviere du Chicot*, literally, river of logs. From the earliest days it was a most important channel of communication, having a slight portage around the cascade at its mouth and another only 1½ miles across to Fort Edward creek. With but these interruptions loaded battoes could pass in time of high water and canoes at all times from Lake Champlain into the Hudson. And the canal has greatly augmented its early importance, occupying as it does the bed of this stream, 6½ miles. It is a meandering, deep, still stream, furnishing no water power except at the falls at its mouth, in the village of Whitehall, where are a grist-mill, plaister-mill, saw-mill, and some lesser kinds of machinery. But its three principal branches have a character the reverse of the main stream.

331. *Mettowee river.*—This is next after the Batten-kill the most valuable mill stream in our county, and indeed the only considerable one between that stream and Otter creek. At a low stage of its water, Sept. 1849, it was found at North Granville to run 1460 cubic feet per minute, and in extreme drouths may be a fourth less than this. By the Canadian French at an early day it was called *La Fourche*, or the fork, i. e. of Wood creek. Colloquially it is designated Pawlet river in Ver-

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mont, Granville river in that town and East creek in Whitehall. A portion of the inhabitants have of late shown their good sense by discarding these conflicting local names and in written documents using only the original Indian name of this stream. It arises in Dorset, Vt., and in this state has a course of 15 miles, draining the waters from 72 square miles of surface. At Granville and Middle Granville are dams on rocky rapids or falls, each giving 8 feet head of water power. At Steele's bridge is a dam and fall of about 12 feet. At the Chandlersville precinct of North Granville is a dam and fall of 16 feet and a few rods below a second one of 12 feet. Nearly a mile onwards, the dam at North Granville is 9 feet in height. A mile and a half onwards is the fall most admired by lovers of natural scenery. The river here, compressed between high cliffs of limestone (figured on a preceding page) in the course of 9 rods makes a descent of 20 feet, mostly in a single cascade. It continues to be a wild, rock bounded stream for a mile or more onwards, passing over two other considerable falls. At no point is the hydrulic power of this stream fully occupied, and some of the most valuable sites for mills and machinery are wholly vacant. One woolen manufactory, 3 carding and fulling machines, 4 grist-mills and 6 saw-mills are the chief establishments at present along its banks. It is crossed by 8 bridges, 4 of them covered, the longest ones being 150 and 200 feet. Its most considerable branch, Indian river, so called from the trout, &c., in it having once made it a favorite resort of the aborigines, is 2 to 4 rods wide and crossed within our bounds by 4 bridges, each about 50 feet long.

332. *Half-way brook.*—This was so named a century ago, as being equidistant between Fort Edward and Fort George. In this county it is crossed by 10 bridges, that at Kane's falls 70, that at Fort Ann (covered) 50 feet long. At Patton's mills is a dam 12 feet high, with a grist and saw-mills. Tripoli dam of similar height has a grist, saw and shingle mills, carding machine and a trip hammer (for manufacturing anchors and sleigh shoes). Kane's falls, 75 feet nearly perpendicular supply a grist and saw mills, machine shop and carding machine. The Padunk* branch of Half-way brook is a mountain torrent, which at Anchorville is occupied by a saw-mill, plaister-mill and clover-seed mill, carding machine, a large tannery and 3 forges and anchor shops with trip hammers. These last employ 50 men or more, making anchors up to 20 and 30 hundred weight, which are sent hence to New York and Buffalo.

333. *East creek.*—Though small, this is an important stream to the town of Hartford, as Moses kill is to Argyle. It furnishes water at Log village for a grist-mill and saw-mill, and at South Hartford for a woolen factory, grist, saw, and plaister mills; whilst one of its branches at Hartford North village supplies a grist-mill.

334. *Poultney river.*—The center of this stream forms the state boundary for a distance of about eight miles. It is far from being entitled to the rank of a river, being so small that in places in Poultney it wholly disappears under the stones and gravel of its bed in a dry

*This I see is the name of a tribe of Indians originally located about Hartford, Ct., and it is not improbable that when driven from thence by the whites, they located themselves in this neighborhood and thus gave name to this stream. But this is a conjecture only; and I have been unable to gain any information respecting the origin of this name.

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time.* Two woolen factories are situated on the New York side of this stream, and it is crossed by three bridges. Near its mouth are three successive falls, within less than a mile of each other, which afford fine water privileges which are as yet but partially occupied.

Other streams, smaller, but great conveniences in their places, particularly in the towns of White creek and Putnam, it is not necessary to speak of in detail. So perfectly do all these and their subordinate branches ramify every part of the county, that a farm of 200 acres can scarcely be found that is not crossed at least by a running brook, that fails only for a short period in the height of the summer's drouth.

335. *Lake Champlain.*—Twenty-two miles of the eastern boundary of the county is formed by this lake, which in consequence of its scenery and the historical incidents with which it is associated is one of the most interesting bodies of water upon the continent. We have space in conclusion of this branch of our subject to give but a short account of the peculiar features which it presents here at its southern extremity or head. It is on some accounts one of the most anomalous bodies of water with which we are acquainted. The lake is over 100 miles long, and from its outlet in Canada, south to Crownpoint is from 3 to 10 miles in breadth. But from Crownpoint to Ticonderoga it is but one and two miles wide; and from hence to Whitehall, a distance of 24 miles it has an average breadth of but half a mile, with a perceptible current in its channel. One hesitates in applying the name of "lake" to such a very narrow, long channel of flowing water; and it is not singular that it has been differently regarded at different times. Formerly the lake was deemed on all hands to terminate at Ticonderoga, if not at Crownpoint, this latter place having received its name probably as was supposed by Mr. Alofsen, from the Dutch term Kruyn-punt, literally implying "summit point." And from Ticonderoga to Whitehall, the water was designated South river by the French, which name also occurs in many early English books; and thus this county was placed in a peculiarly paradoxical situation, with the South river upon its northern, and the North river upon its southern borders, as though the magnetic poles were here permanently reversed. Others regarded this long, narrow channel as being more properly a mere continuation of Wood creek, and hence speak of this stream as running to Ticonderoga. There was so much doubt as to what was the correct designation of this channel, that in some of the early land grants along its borders, the authorities of the province do not venture to apply any name to it, but specify it as "the waters running from Wood creek into Lake Champlain." It was not till since the revolutionary war that the present view of this subject became current; and now, by universal consent Lake Champlain is regar-

*All those streams smaller than rivers, which the Dutch called "kills," and those which are mere creeks or even brooks in size, were invariably exalted to the rank of rivers in the grandiloquent nomenclature of the early settlers of the adjacent Vermont towns, as Green river, Hubbardton river, &c.; and in scarcely an instance do we meet with an admission that anything so insignificant as a creek or a brook could be found in those towns. And thus in this county we come to have such singular anomalies as Half-way *brook* a stream of more than double the magnitude and importance of Indian *river*; and our children, taught in their geographies that "creeks form rivers," on looking around them see two rivers united forming but part of a creek—Indian and Mettowee *rivers* being branches of Wood *creek*. This fact merits notice more particularly, as being one of many evidences showing what was the character of the early settlers immediately east of us; whose inflated statements and gross exaggerations have been spread before the world as historic truths.

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ded as commencing where Wood creek enters the harbor of Whitehall. In consequence of this change, persons conversant with the localities and the names as they are now applied are often confused in reading historical works and are led into the erroneous idea that early writers were grossly ignorant of the geography of this district; and within a few years the rival writers have had a sharp controversy in one of our metropolitan newspapers upon the question "Where does Wood creek enter Lake Champlain?"

The southern portion of this lake is a spot of much interest, both to the geographer and the geologist. It occupies a narrow chasm or defile formed by those fractures and uplifts of the rock strata which are common all through this district. And so much of its surface is a morass with precipices often rising abruptly on either side, that a most truthful idea of it is given in a line of the once popular comic song, in which it is described as

"A little pond half full of water."

The head of the lake is divided as it were into three distinct arms. The middle one of these is the harbor of Whitehall. Nearly a mile below this, East bay makes off from the lake to a distance of seven miles; and a mile below this, South bay extends in an opposite direction nearly the same distance. Poultney river enters the head of East bay. Wood creek and the Mettowee united enter the harbor of Whitehall; South bay on the other hand, only receives small brooks from the contiguous mountains. At a remote period there is no doubt that the entire chasm was occupied by deep water, extending in an unbroken sheet from the head of East and of South bay and from the harbor of Whitehall, to Canada. But the streams above mentioned have been at every flood bringing into two of the three heads of this chasm, quantities of mud, sand and gravel. This sediment has been accumulating, until it has now filled up and changed into a morass, East bay through its entire length, and the main chasm from Whitehall to a distance of 12 miles, leaving but a narrow channel of clear water about 100 feet broad, winding through the marsh. South bay on the other hand, receiving only clear mountain brooks remains in its original condition, "a smooth expanse of deep water. And thus has come to be formed the "Twelve Mile Marsh" as it is at present called, the *Grand Marais* as it was named by the French settlers in Canada at an early day extending from Whitehall half way to Ticonderoga It is a vast mud flat, overgrown with rushes, flags, lilly-pads and sedge-grasses, the wild rice (*Zizania aquatica*) thriving luxuriantly in places, affording an abundant supply of food to the aquatic and other birds that resort here in great numbers. The narrow channel that winds through this marsh from side to side, here and there sends off arms or branches, separating portions of the morass into peninsulas and islands. Of these branches the two most considerable ones are "the Two channels" and the "Four channels," the latter being the four mouths by which the channel finally ends in the clear waters of the lake. And in geographical strictness the lake can scarcely be regarded as reaching further than this point, all above it being a navigable river rather than a lake.

The cuts of Mr. Morris' animals, noticed under "ILLUSTRATIONS," were not received in time to be inserted.

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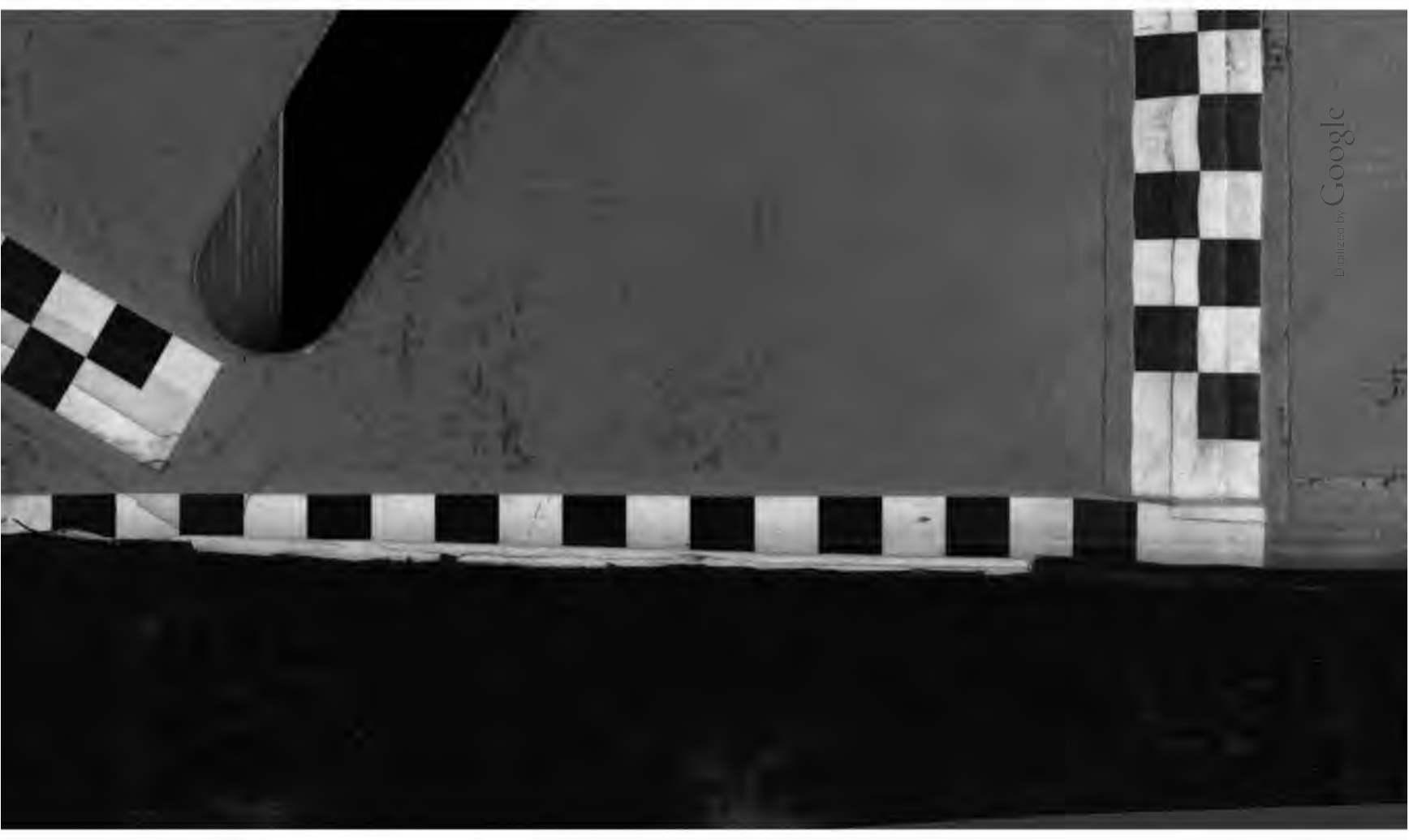
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